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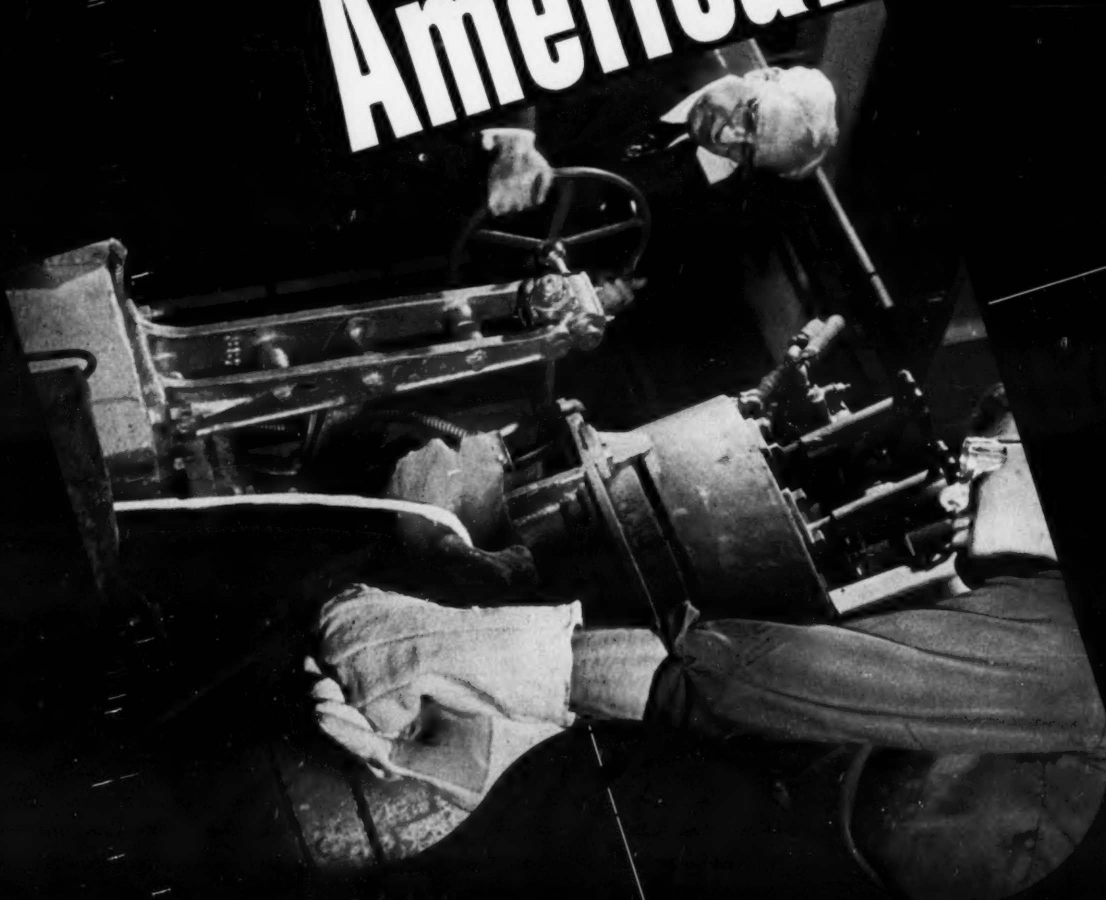

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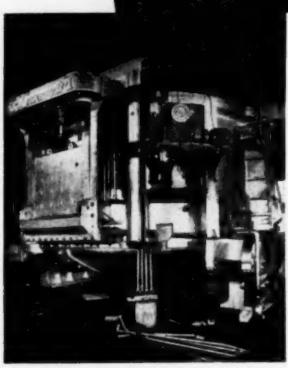

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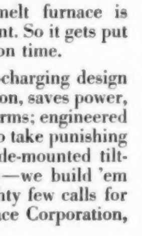

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CONTENTS

VOLUME XIX, NUMBER 6

American Foundryman

June, 1951

Official publication of American Foundrymen's Society

33 Editorial. You CAN Take It With You.

34 Problem in Gray Iron Molding. John W. Birks.

38 A.F.S. Building Fund Reaches $140,000 Mark.

40 A.F.S. 55th Convention News Story—Part II.

45 Factors Governing Sea Coal Selection and Control: E. C. Zirzow.

48 Modern Foundry Methods: Straighten Malleable Iron Castings: L. N. Schuman.

50 Bentonite Bonding Properties Affected by Drying Temperature and Moisture Content: F. L. Cuthbert and T. M. Dyer.

52 Absorbing the Technical Trainee: Collins L. Carter.

55 Foundry Open House at Three Engineering Schools.

56 Foundry Organizations Elect 1951-52 Officers and Directors.

57 Colorimetric Aluminum Determination in Titanium-Bearing Steels: J. Carroll, I. Geld and George Norwitz.

58 Plan Full Use of Purdue University Foundry Laboratory This Year.

59 Install Penn State College as Eleventh A.F.S. Student Chapter.

60 Who's Who.

61 New A.F.S. Members.

64 Chapter Officers and Directors.

66 Foundry Personalities.

68 Chapter Activities News.

80 New Foundry Products.

82 Foundry Literature.

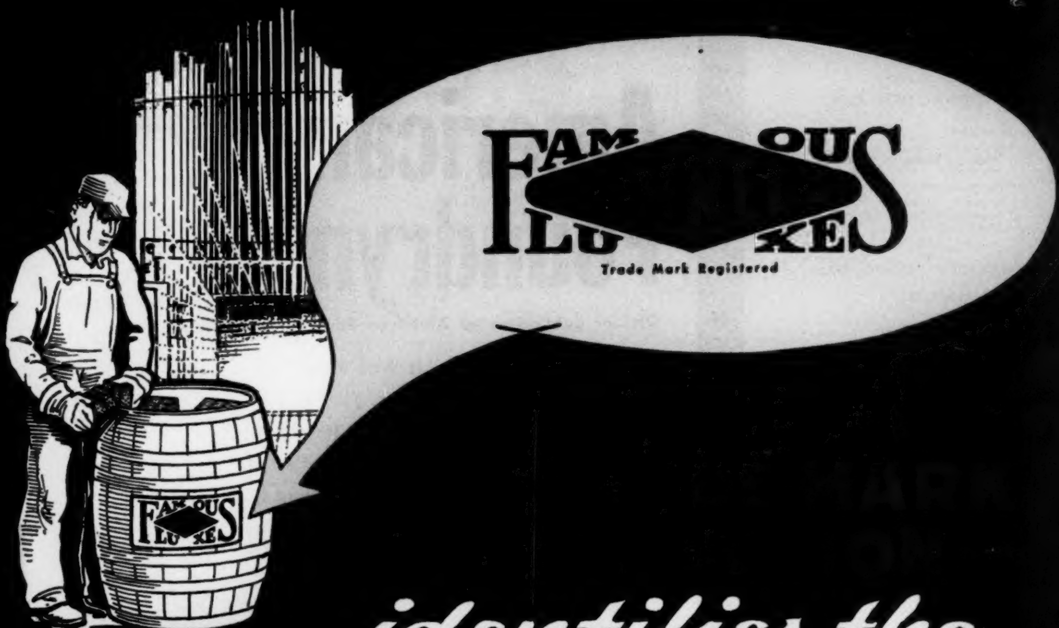
88 Foundry Firm Facts.

96 Advertisers' Index.

97 A.F.S. Employment Service.

Increased interest of students and the public in foundry open houses held by engineering schools and industrial shops indicates a trend toward foundry-mindedness and greater awareness of the role of castings in every phase of living. On the cover, R. E. Kennedy supervises distribution of molten iron by University of Illinois (Navy Pier) students at one of these popular open houses.

Published monthly by the American Foundrymen's Society, Inc., 616 S. Michigan Ave., Chicago 5. Subscription price in the U. S., Canada and Mexico, $3.00 per year; elsewhere, $6.00. Single copies, 50c. Entered as second class matter July 22, 1938, under Act of March 3, 1879, at the Post Office, Chicago, Illinois. EASTERN REPRESENTATIVE—C. A. Larson & Associates, 254 West 31st St., New York 1, N. Y. CENTRAL REPRESENTATIVE—Enright & Cleary, 1836 Euclid Ave., Cleveland. MIDWESTERN REPRESENTATIVE—H. Thorpe Covington Co., 677 N. Michigan Ave., Chicago.



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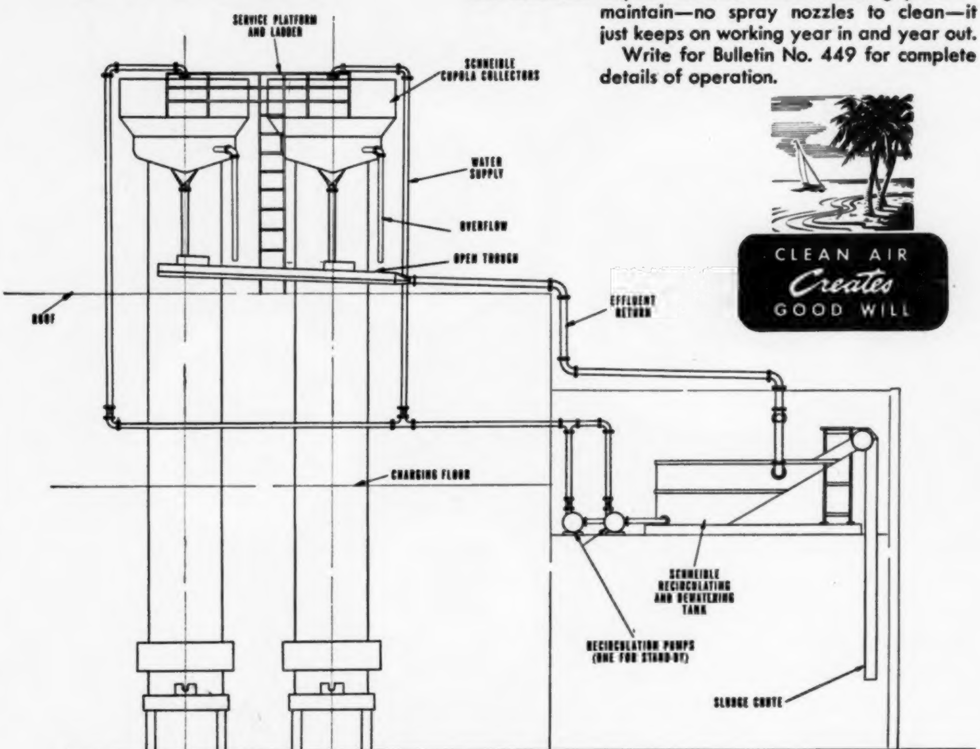

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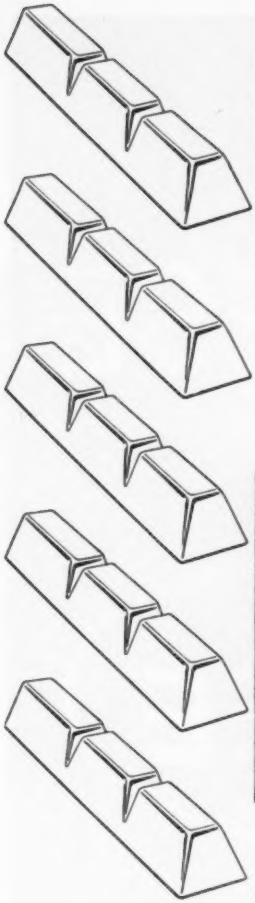

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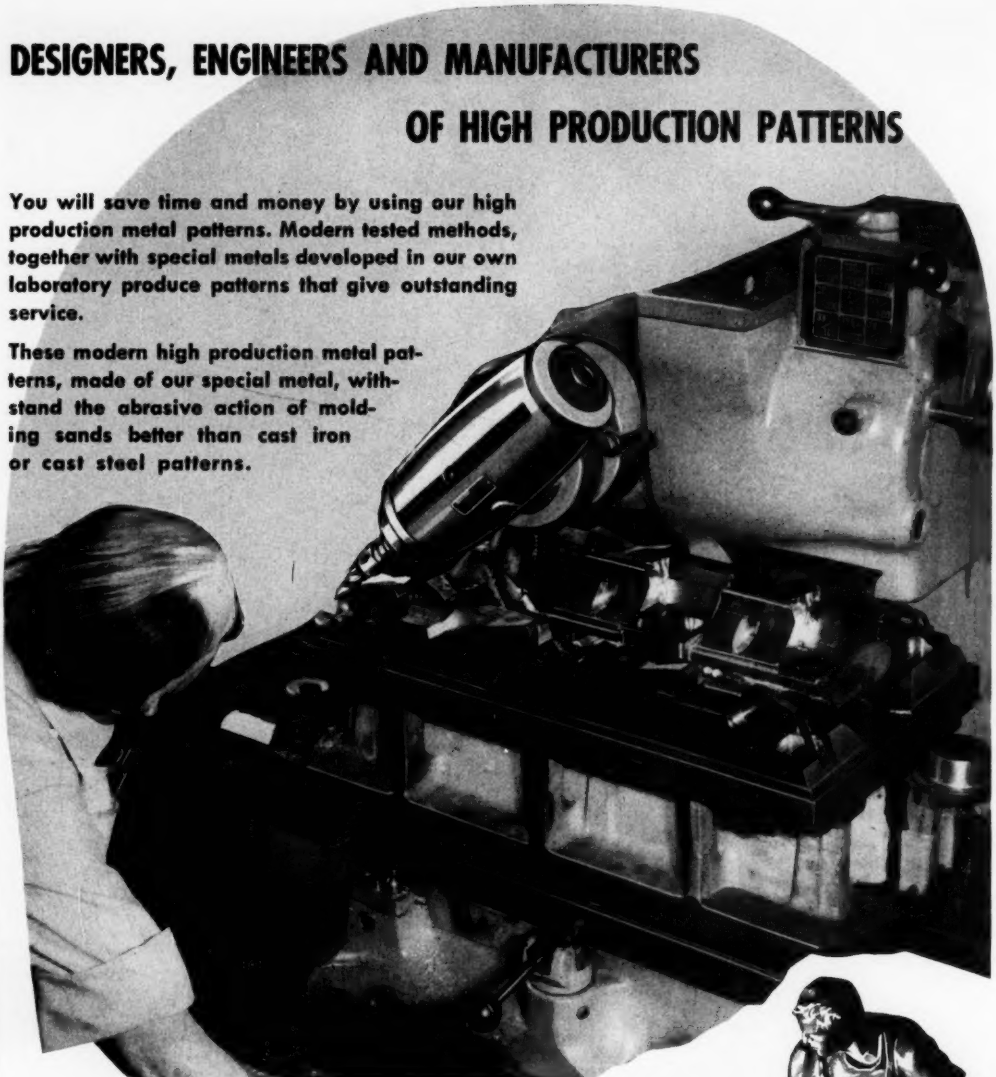

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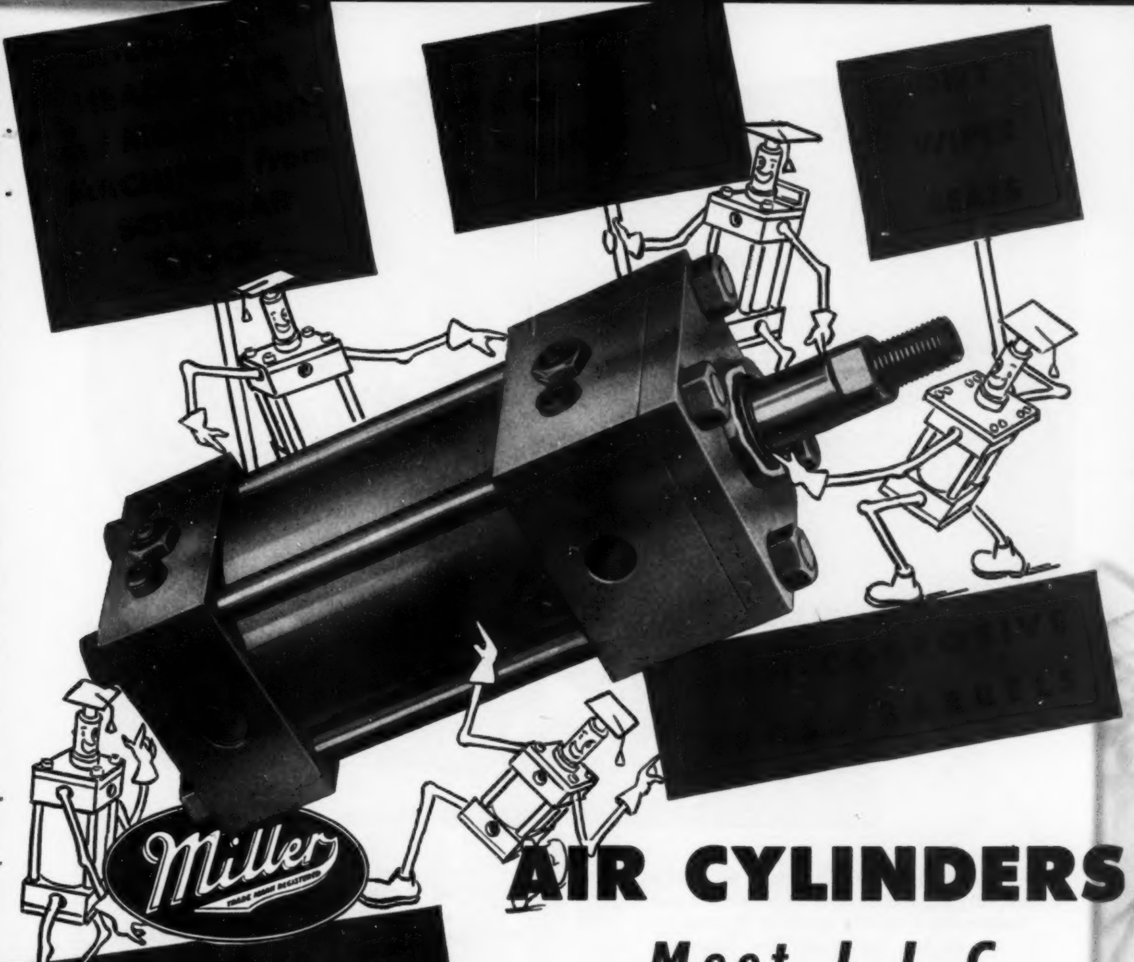
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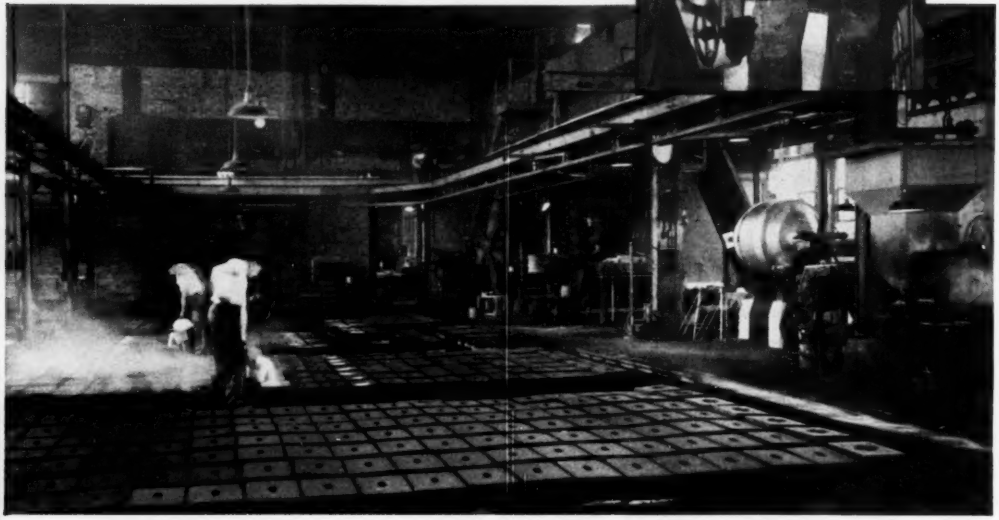

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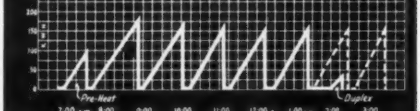

Operating graph, Type LFY, 175KW, 700 lb. Detroit Electric Furnace, melting gray iron. Charge, 600 lbs. Total metal, 4200 lbs; total KWH, 1296; av. power consumption, inc. preheat, 617 KWH/ton; total hours operation, 8½; av. melt time, 59 mins.

cold melts until the cupola is ready to tap. They usually have six cold heats, then cold cupola iron is put into the Detroit Electric Furnace, heated, and poured into molds. Furnace used, with excellent efficiency, about 80% unbriquetted borings.

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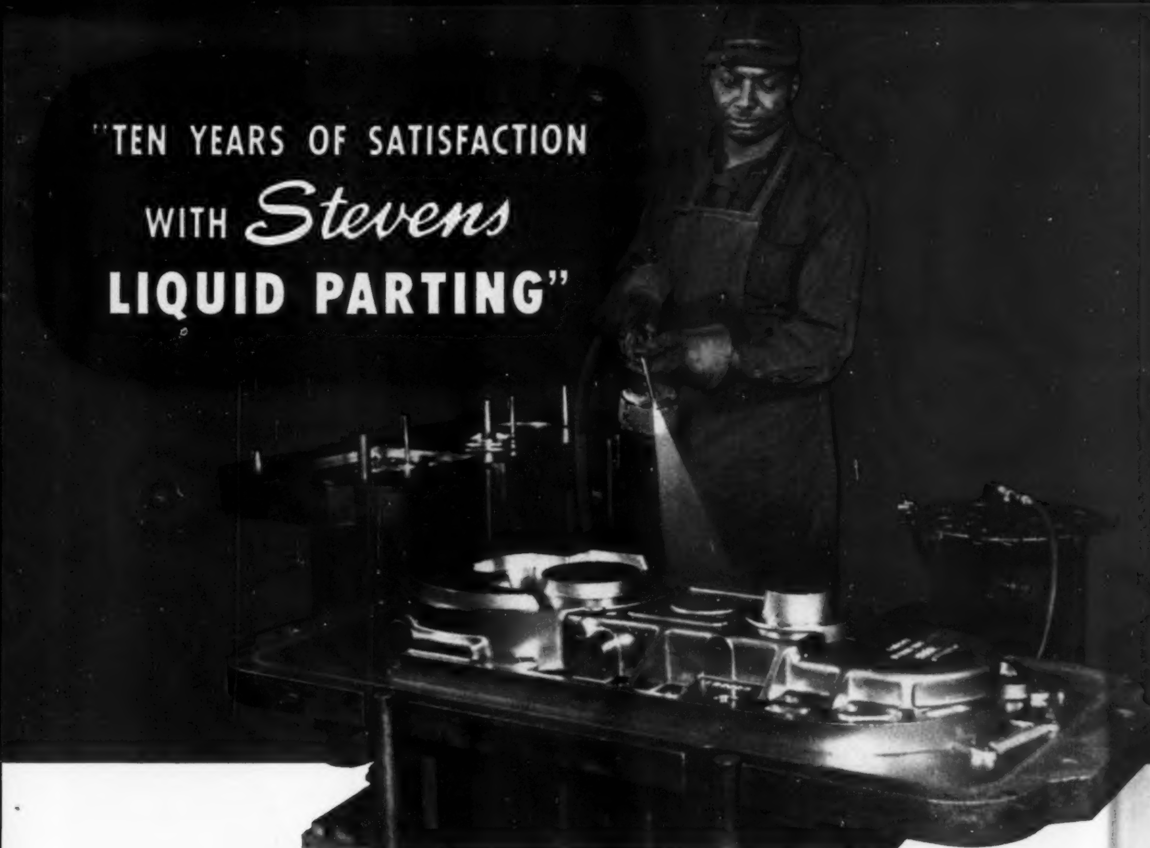

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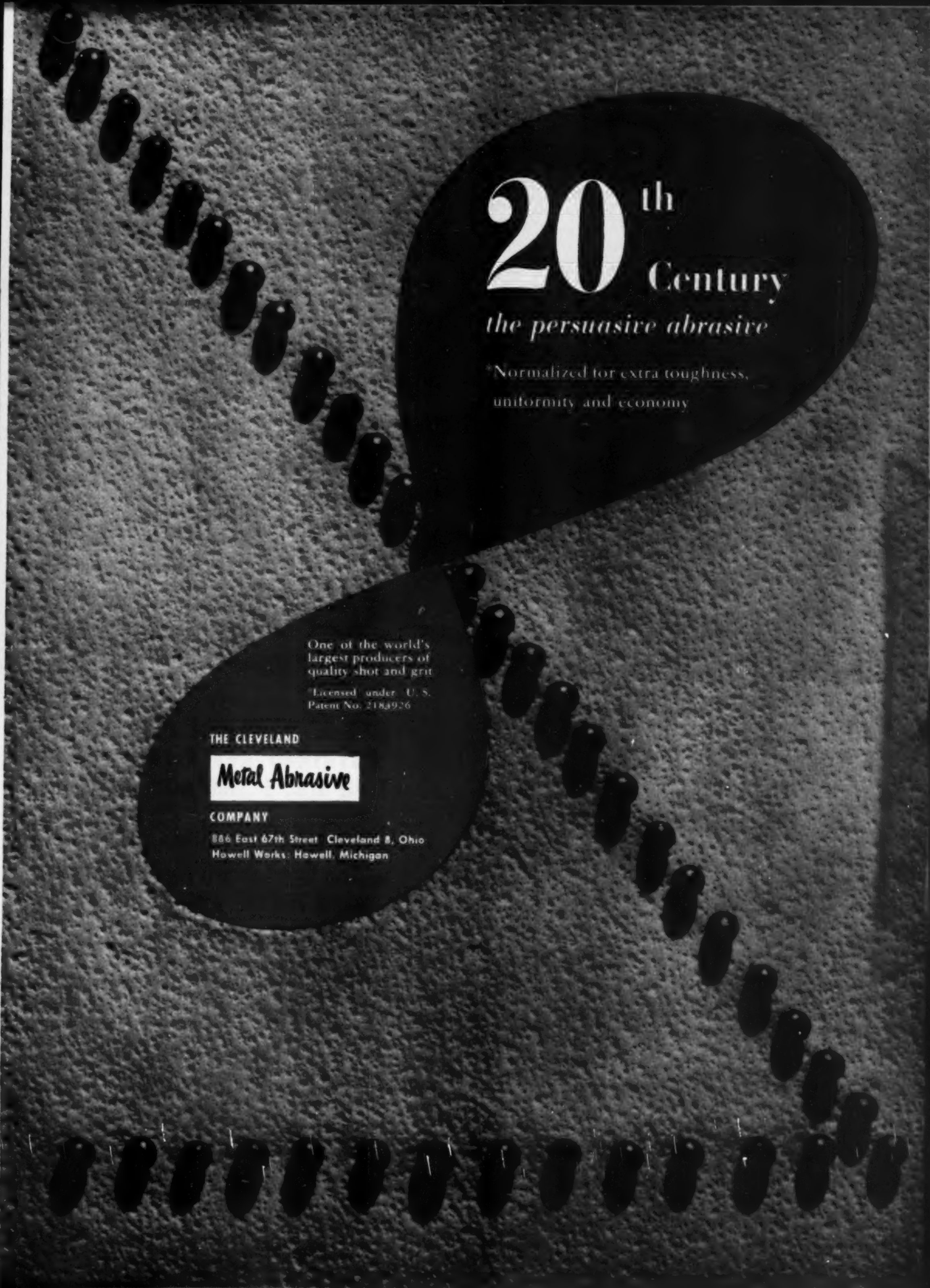

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International trade, free exchange of ideas, and world brotherhood of men with a common interest — the casting of metals — will be highlighted at the 1952 International Foundry Congress, May 1 through 7, Atlantic City, N. J. Next year's international meeting combines the American Foundrymen's Society's Annual Convention and its biennial Exhibit in the first International here since 1934.

A.F.S. and the foundrymen of North America will play host to their colleagues from all over the world for the first time since 1934 when the International Foundry Congress and show is held in Atlantic City, N. J., the week of May 1 through 7, 1952.

The International Congress symbolizes—on a worldwide scale—what the American Foundrymen's Society and some other foundry organizations here and abroad stand for and practice: free and cooperative exchange of information. Proponents of this principle will gather at this year's international meeting in Brussells, Belgium, September 10-14.

At an International Foundry Congress, foundrymen engage in a peculiar form of barter at which they have become adept through long experience in discussions ranging from casual conversations to formal addresses at national meetings. Everyone participating in this barter gains... no one loses... all come out of the exchange with everything they had at the start plus whatever has been acquired from others.

Retaining that which is given away is possible only when ideas are exchanged. Two men, each with a dollar's worth of goods to exchange have only that much when a trade is made. But two men, each with an idea or experience to share, conclude their exchange with two ideas apiece.

You can give away an idea, yet you can take it with you!

The 1952 International Foundry Congress and Show is expected to be the greatest mart for exchanging information the foundry world has seen. Starting Thursday, May 1, and continuing through Wednesday, May 7, next year's international meeting provides foundrymen with a full week of technical meetings coupled with an unequalled exhibit of equipment, supplies, and services. Facilities include the world's largest auditorium where the exhibit and meetings will be held and the more-than-adequate housing provided by the 27,000 rooms of Atlantic City's 40 first class hotels.

Facilities are unexcelled from the standpoint of both exhibitor and Convention-goer. Atlantic City has well over three times the number of hotel rooms of any other city in which the Convention has been held. The main hall of the auditorium which will house the exhibits is 488 feet long and 288 feet wide with no columns to obstruct the view or interfere with erection of operating displays. The roof, 137 feet high, is supported by the largest trusses in the world. Both freight and passenger trains can be unloaded at auditorium entrances and wide ramps permit automobiles to be driven to any part of the building.

Major Convention sessions will be held in the ballroom, which seats 5,000 persons comfortably. Numerous meeting rooms, each seating from 50 to 500, will accommodate an additional 12,000 persons at one time.

Extensive visits to foundries on the Eastern Seaboard are contemplated for Convention attendants. Plans for overseas visitors include a 28-day tour of Eastern and Midwestern foundries, pattern shops, and related plants. Tentatively scheduled for the tour are foundries in New York, Cleveland, Cincinnati, Philadelphia, Detroit, Birmingham, Pittsburgh, Chicago, Buffalo, and Milwaukee.

Technical program of the 1952 International Foundry Congress, running concurrently with the week-long exhibit, will include nearly 100 technical sessions, round table luncheons, dinner meetings, symposiums, and shop course meetings. Among technical papers will be the Charles Edgar Hoyt Annual Lecture, official exchange papers from the Institute of British Foundrymen, Association Technique de Fonderie de France, Institute of Australian Foundrymen, and other overseas foundry organizations, reports on A.F.S.—sponsored research projects, and committee reports.

The Annual Business meeting and the Annual Banquet will be held the middle of Convention Week to permit the maximum number of attendants to participate. Social gatherings during the week will include an International Reception, the A.F.S. President's Reception, the A.F.S. Alumni Dinner, and a Ladies' Entertainment program.

With such opportunities to swap ideas and learn of the latest developments in equipment and supplies, foundrymen of the world can well look forward to the 1952 International Foundry Congress.

—Editor

PROBLEM IN GRAY IRON MOLDING

J. W. Birks
Montreal, Que., Canada

EVERY NEW CASTING presents the foundryman with the problem of devising methods which will produce it satisfactorily. After a careful study of the drawing he must decide upon the pattern construction and molding method for the job.

The job described here is a gray iron still casting which must be sound in order to withstand high pressures in service (Fig. 1). After due study of all factors it was decided to mold the job vertically, using a dry sand mold.

The poured weight of the casting is approximately 3300 lb, and the cleaned weight 3060. Metal composition is: total carbon, 3.0-3.5 per cent; Si, 1.75-2.25; Mn, 0.6-1.0; S, 0.1 max; P, 0.25 max. Pouring temperature is 2500-2600 F. Over-all dimensions are 62-in. length and 28-in. width, and 16-in. thickness. Outside wall sections are 1¾-in., and sections between the still chambers are 4 in. Openings between the end and center chambers are 4 x 10 in. The 12-in. diameter bosses have 5-in. diameter center bores, 3½-in. wall thicknesses, and extend 4 in. above and 2 in. below the 1¾-in. chamber wall section. Fillet radii are 1 in. inside and 2 in. outside.

The pattern is made of the less expensive yellow pine as only a small number of castings is required. Constructed in three sections to suit the molding method adopted, the pattern is braced diagonally (Fig. 2) to prevent twisting and warping, and is fitted with dowel pins and holes to ensure a true fit at the joints when assembled. Facilities for rapping and withdrawing the pattern from the mold are also fitted.

The core boxes are made in yellow pine (Figs. 3 and 4). The main body core box is set on a board and doweled for location. Bosses and prints are made loose to be interchangeable, as all three body cores are made out of the same box. The box for the 4½-in. diameter core, which forms the bore at each end of

This paper was presented as part of the "Problem Casting Forum" at the Nov. 10, 1950, meeting of the A.F.S. Eastern Canada Chapter, at Sherbrooke, Que., Canada.

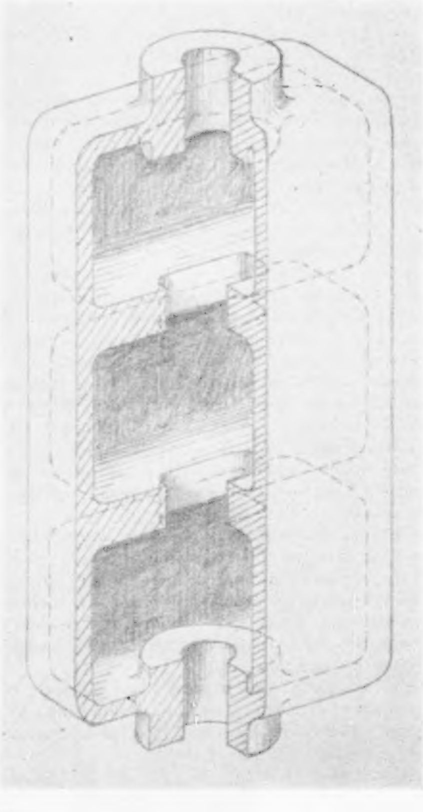
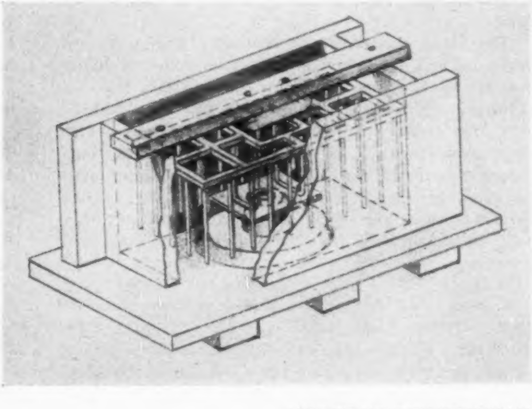


Fig. 2 (right)—The yellow pine pattern is constructed in three sections and fitted with dowel pins and holes to align joints when assembled. Diagonal bracing of the frame prevents twisting.

Fig. 1 (left)—Cutaway drawing showing details of the gray iron still casting. Soundness is required to withstand service pressures. Poured weight, 3300 lb; cleaned weight, 3060 lb. Metal composition: total carbon, 3.0-3.5 per cent; Si, 1.75-2.25; Mn, 0.6-1.0 S, 0.1 max; P, 0.25 max.

Fig. 3 (below)—Cutaway drawing of the core box used for the three main body cores showing the arrangement for core iron reinforcement. Bosses and core prints are made loose and are interchangeable.



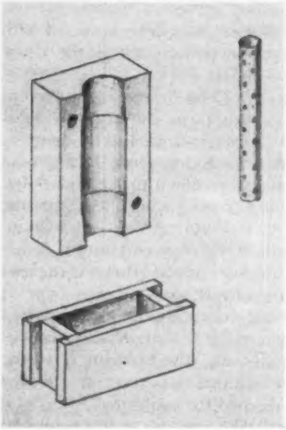
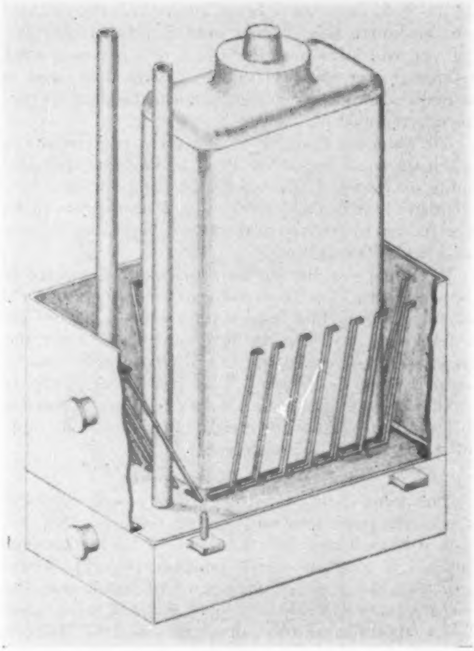


Fig. 4 (left)—Cores which form the 4½-in. bores at each end of the still casting are made in a split core box with a 2-in. perforated pipe rammed up in the center. The frame box is used for the rectangular cores.

Fig. 5 (right)—The first cheek section is placed on the drag, and gaggers are placed ½-in. from the pattern. Two 1¼-in. by 4-ft pipes are positioned to form the down sprues.



the still, is made in halves, and the box for the rectangular cores between the main body cores is a frame.

The cast iron molding flask is large enough to provide at least 6 in. of sand on three sides of the pattern, and 8 in. on the side where the runners are located. The flask is in four sections (cope, two middle sections, and drag). The reason for using two middle sections is for convenience when finishing and coring up the mold. Lugs for clamping, trunnions for lifting, and pins for locating are provided on each section. Each middle section has a narrow internal flange (⅞ in. wide) all the way around at joint level to prevent the sand from slipping after the mold is rammed up. Cross bars in cope and drag should be ¾ in. clear of the pattern.

The heavy sections of the casting prevent rapid solidification of the metal and, therefore, a sand with high refractory qualities is required to prevent fusion. Permeability must also be high to allow for free passage of the gases from the mold. Naturally bonded sands with a high sintering point over 2600 F, clay content about 20 per cent, grain fineness 64, and permeability 170 would be suitable for the job. A suitable facing sand for the mold could be made with 60 per cent of new sand and 40 per cent floor sand. A small amount of chopped hay could be added (1 per cent), the mixture mulled for 6 min, with moisture at about 10 per cent. A mixture for the cores would consist of 40 per cent naturally bonded new sand, 40 per cent floor sand, 20 per cent silica sand, 2 qt cereal binder, and chopped hay (1 per cent).

The bottom section of the pattern is placed on a ramming board, and the drag placed over it. The pattern is set in a position equally distant from three sides

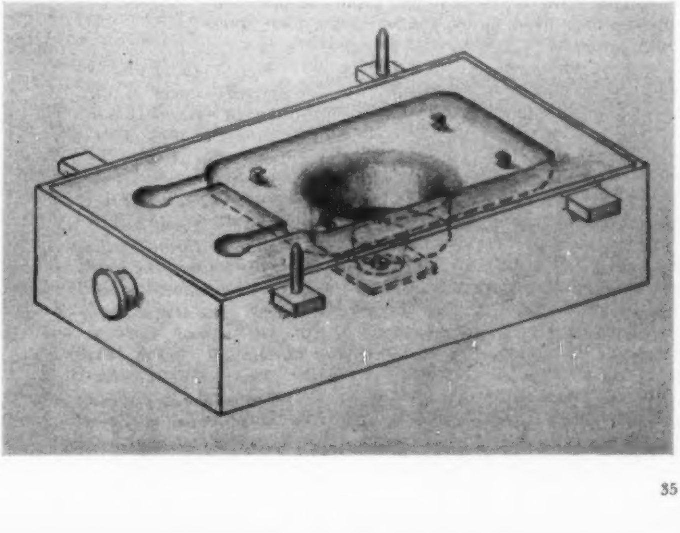


Fig. 6—The ingates are cut in the drag joint for bottom pouring. The 4½-in. diameter core is set in the core print, and four chaplets are placed to support the body core. The plate in the body core, the perforated pipe in the 4½-in. core, and the plate forming the bottom of the core print provide a solid bearing to take the weight of the body cores.

of the flask, extra space being allowed for the runners on the fourth side. Facing sand is riddled over the pattern and joint to a depth of 2 to 3 in., floor sand is spread over this and rammed, more floor sand is added and ramming continued until the drag is completely rammed up.

All ramming must be very firm to prevent strain when the mold is poured. Prior to finishing the ramming operation, a piece of flat iron plate with a 1-in. diameter hole in the center is placed on the core print and packed to the bars of the drag. The reason for this will be explained later.

Ramming completed, the area over the pattern is vented with a $\frac{1}{4}$-in. diameter vent wire to within 1 in. of the pattern. The drag is then rolled over, set on a level sand bed, and the first joint made. Later the ingates are cut in this joint (Fig. 6) as this mold is poured from the bottom. This method of gating is similar to that employing a horn gate. Less turbulence is created in the flow of metal, and a certain amount of self feeding is accomplished.

Forming the Down Sprues

The joint is dusted with parting powder and the rest of the pattern assembled, and the first cheek section is placed over the pattern. Two $1\frac{1}{4}$-in diameter pipes 4 ft long are set in position (Fig. 5). These will form the down sprues when withdrawn after the mold is rammed to the top joint. Riddled facing sand is spread on the joint to a depth of 1 in., and lifters or gaggers are set in this $\frac{1}{2}$-in. from the pattern to prevent mold sag when the pattern is withdrawn and the mold parted.

A 2-in. thickness of facing sand about 6 in. high is placed against the pattern, backed with floor sand and firmly rammed. This operation is repeated until the first middle section is rammed up, after which another joint is made and dusted with parting powder.

Upon completion of the top joint the pipes which form the down sprues are withdrawn, and a piece of sheet metal about $2\frac{1}{2}$-in. square by $\frac{1}{8}$-in. thick is placed over each sprue opening to keep out the sand when the cope is rammed. The joint is dusted with parting powder and the cope placed in position for ramming. Two $1\frac{1}{4}$-in. diameter pipes are placed in the cope for down sprues, contacting the joint about 3 in. away from the down sprues in the middle section. The two sets of down sprues are connected with a gate of the same cross-sectional area as the down sprue when the mold is finished.

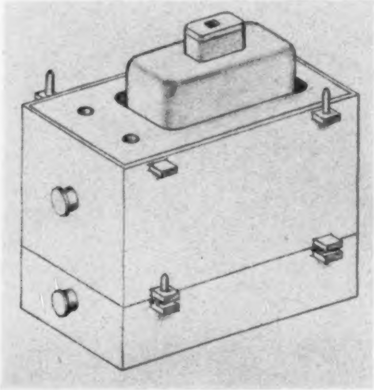
A 2-in. diameter peg is placed on the highest point of the casting—the boss—to form the riser. A layer of riddled facing sand is placed all around the pattern, lifters are placed where necessary, more facing sand is spread over the pattern to the thickness of 3 in., floor sand is added and ramming continued until the cope is rammed up.

Loose sand is scraped off the cope and sand is firmly tucked with the hand rammer around down sprue and riser pegs. These are withdrawn and the cope is lifted off, the pattern withdrawn, and the mold parted and finished. It is then given a coat of wet charcoal blacking applied with a swab (the blacking is a mixture of powdered charcoal and clay water, first mixed into a paste and then diluted for swabbing).

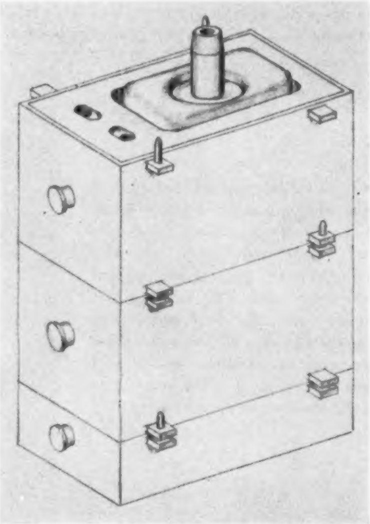
The blacking is allowed to set for a few moments and then sleeked into the face of the mold, after which a thin plumbago wash is applied with a camel hair brush to give a clean skin to the casting. The mold is then ready for baking at a temperture of 450 to 500 C. Baking should be slow to avoid formation of unsightly cracks in the face of the mold.

In the general jobbing foundry, molds of this type usually are baked overnight. The oven is brought to temperature, held there for about 4 hr, and then allowed to cool gradually. This gradual cooling allows the mold to soak and when withdrawn from the oven it should be perfectly dried. The complete baking cycle is about 10 hr. One molder and a helper should make one casting a day, that is, put a mold in the oven to bake and pour a mold. Cores would be supplied from the coreroom, the time allowed per set being 6 hr for one coremaker.

Should the mold face crack during baking a paste blacking (of the same material used for the wash) is



Figs. 7 (left) and 8 (right)—Stages of the mold assembly are shown in these drawings. The mold at the right is ready to receive the cope. At this stage a $\frac{3}{4}$-in. bolt is passed through the core centers, the head resting on the packing plate (Fig. 9) and the thread end extending below the bars in the drag. The nut on the thread end is tightened to prevent lift of the cores.



worked into the cracks with the fingers, and then washed over with the plumbago wash. If possible patching should be done while the mold is hot, thus giving the patch time to dry out.

Core irons (Fig. 3) are used for reinforcing the walls of the body cores, 1- to 1¼-in. clearance being allowed between core iron and core box. The core walls are of rammed sand and the interior is filled with coke, also rammed firm. A 2-in. diameter hole is made through the center of each core to allow free passage of gases when the mold is poured. This hole also serves as the passage for the long bolt which is used to bolt the body cores down when assembled.

Constructing Top and Bottom Cores

A packing plate is built into the bottom and top body cores (Fig. 9). Their respective uses will be explained later. The 4½-in. diameter cores located at the top and bottom are made with a 2-in. diameter perforated pipe the full length of the core, rammed up in the center (Fig. 4). The pipe in the bottom core acts as packing, and takes a certain amount of weight from the body cores which rest upon it. It also prevents core collapse.

The rod for bolting down the body cores also passes through the lower pipe, while the pipe in the top core acts as a vent. The rectangular cores located between the body cores are reinforced with core irons to prevent collapse (Fig. 3).

When the mold is drawn from the oven it is cleaned of all soot and dust and examined for defects. Necessary repairs are made, and the mold sections and cores then are ready for assembly.

The drag is placed on a level sand bed, and the 4½-in. diameter core is set in the core print and centered. Four chaplets the thickness of the metal are placed as shown in Fig. 6. These chaplets balance the body core when it is placed in position, and are fused into the metal during pouring of the mold. When the body core is placed in postion the plate in the core, the pipe in the 4½-in. diameter core, and the plate forming the bottom of the core print provide a solid bearing (Fig. 9).

Figures 7 and 8 illustrate various stages of the mold assembly. All joints are sealed with soft fire clay or core paste during the core build-up to prevent metal penetration into the vent. When assembly has reached the stage shown in Fig. 8 a long ¾-in. bolt is passed through the centers of the cores, the head resting on the packing plate previously mentioned, and the thread end protruding below the bars in the drag. An iron plate with a ⅞-in. diameter hole in the center and long enough to reach across the center bars of the drag is placed over the thread end of the bolt. The nut is then screwed on and tightened sufficiently to prevent any lift of the cores.

Top Core Vent Provided

Figure 9 is a cutaway section of the mold after the cores have been bolted down. The cavity above the bolt head is filled with small coke and the bottom of the print for the 4½-in. diameter core remade, not overlooking the continuation of the vent. The 4½-in. core is placed in the print and the cope put on.

All sections of the molding flask are clamped together as shown in Fig. 9. The runner and riser basins are made up, and the vent is carried through the cope by means of an iron pipe rising 6 to 12 in. above the level of the pouring basin. The completed mold is picked up by the crane and placed on a level sand bed in the pit, which has sufficient depth to allow sand to be rammed all around the molding flask up to the middle joint. When the mold has been poured feeding is required, and this can be done by hand with a ½-in. rod pumped up and down in the riser basin, or by use of an exothermic or insulating material. Both methods give good results if properly applied.

After feeding is complete and the metal has solidified the mold is lifted out of the pit, and the nut on the bolt which passes through the center of the cores is released to relieve any tension which may be caused through expansion of core irons, packing plates, etc. The casting is allowed to cool before stripping.

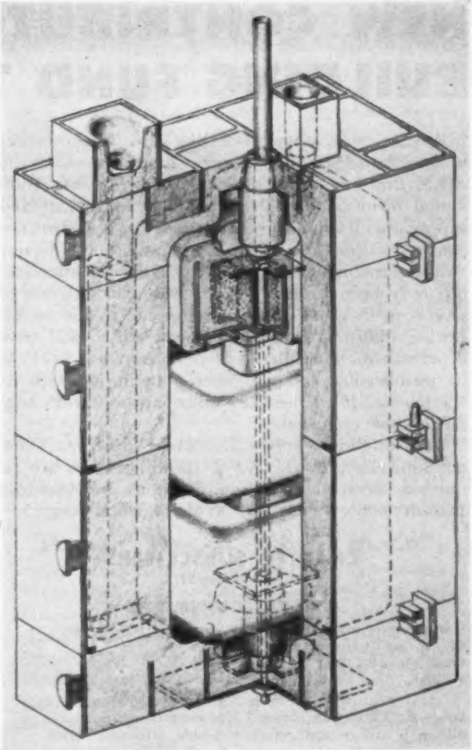


Fig. 9—This section through the completed mold shows the packing plates built into the top and bottom body cores, the 2-in. perforated pipe through the top and bottom 4½-in. cores, and the bolt extending from the packing plate in the top body core through a plate below the bars of the drag. The cavity above the bolt head is filled with small coke and the bottom of the print for the 4½-in. core is remade, allowing for continuation of the vent, before setting the core and putting on the cope. The vent is carried through the cope by a pipe rising 6 to 12 in. above the pouring basin.

NEW CONTRIBUTIONS SWELL A.F.S. BUILDING FUND TO $140,000 MARK

ROSTER OF CHARTER SUBSCRIBERS to a permanent home for the Society continues to grow, swelling the A.F.S. Building Fund to more than $140,000. Individual members, foundries, foundry equipment and supply organizations are offsetting rising construction costs with contributions that will provide the Society with a permanent headquarters having facilities adequate to meet the needs of an expanded program of service to its growing membership and to the metals casting industry. When completed, A.F.S. will have a permanent home that will be a source of pride to its membership and will be commensurate with its leading role in the metals industry as the world's largest foundry organization.

Individuals and firms still desiring to become Charter Subscribers to the A.F.S. Building Fund are requested to send their contributions to American Foundrymen's Society, 616 S. Michigan, Chicago 5.

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(April 27-May 22)

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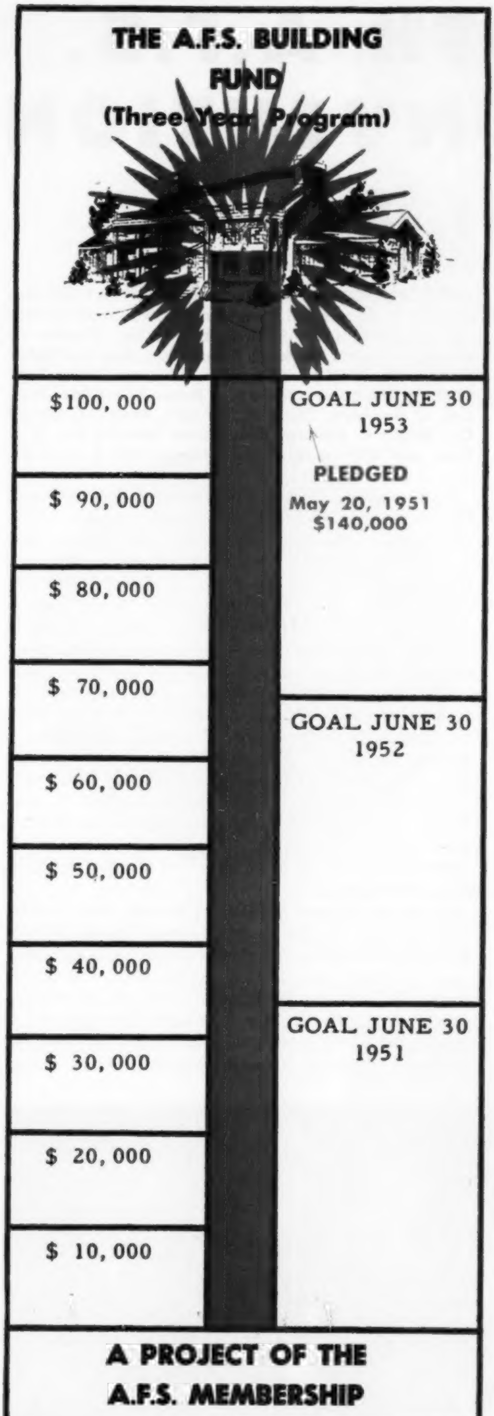


Urge Prompt Selection of National Nominating Committee Candidates

CHAPTERS NOT REPRESENTED on the Nominating Committee during the past two years are eligible to suggest candidates for the 1951-52 committee. Eligible chapters should forward names of two members for possible appointment to the Nominating Committee to the National President not later than July 1 as prescribed by Art. X, Sec. 1, of the By-Laws: "*The Board of Directors of each Chapter eligible to have a member on the Nominating Committee shall annually select two candidates for the Nominating Committee from the Chapter membership, preferably representing different branches or divisions of the industry with the membership. The names of the candidates shall be forwarded to the President on or before July 1 of each year.*"

Chairmen of eligible chapters who have not done so are urged to call board meetings to select Nominating Committee candidates. Names should be sent to Walton L. Woody, President, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

Present Wm. A. Gibson Medal

FIRST PRESENTATION of the Wm. A. Gibson Medal took place at the Annual Prizegiving last fall at Sydney Technical College, Sydney Australia. Made possible by Wm. A. Gibson, Gibson Engineering Pty. Ltd., Redfern, Sydney, the bronze medallion was awarded to Lindsay McIntosh for high scholarship in the foundry technology course. The medal may be awarded only

to adult students who have served an apprenticeship and is designed to reward those who continue to develop themselves in foundry and related sciences. The medal will be awarded annually. Design of the medal was selected on the basis of a competition conducted among art students at Sydney Technical College.

Mr. Gibson is well-known as a foundry engineer in Australia and abroad and is a frequent attendant at A.F.S. Conventions. He is Australian representative on the American Foundrymen's Society's International Relations Committee.

55TH A.F.S. CONVENTION

News Story

AMERICAN FOUNDRYMAN reporters for the 55th Annual A.F.S. Convention were Hiram Brown, Solar Aircraft Co., Alfred H. Hesse, R. Lavin & Sons, Inc., Gordon W. Johnson, Armour Research Foundation, Guy A. Pealer, General Electric Co., Kenneth H. Priestley, Vassar Electroloy Products, Inc., William H. Ruten, Polytechnic Institute of Brooklyn, Clyde A. Sanders, American Colloid Co., Robert P. Schauss, Illinois Clay Products Co., E. C. Troy, and Wilfred H. White, Jackson Iron & Steel Co.

PART II

(Part I appeared in May issue)

TUESDAY, APRIL 23 (Continued)

Another feature Convention event, held for the first time this year, was the timely Foundry Equipment & Supplies Luncheon, sponsored jointly by the Foundry Equipment Manufacturer's Association and the Foundry Facings Manufacturers' Association. Held at noon, Tuesday, April 24, in the Statler Hotel, the Luncheon brought together top National Production Authority officials and foundry supply and equipment men to discuss problems of their industry.

First Luncheon speaker was Aubrey J. Grindle, Whiting Corp., Harvey, Ill., Director, Foundry Equipment and Supplies Section, Machinery Div., National Production Authority, Washington. Grindle described the makeup of NPA and pointed out that Washington now recognizes the foundry as a basic industry. All production is going to be controlled, he said, and the biggest current problem is to determine soon and accurately the industry's needs for the year's third quarter.

Following speaker was Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, Industry Consultant to the Foundry Equipment and Supplies Section, Machinery Div., NPA. Mr. Kaveny described the Controlled Materials Plan, scheduled to go into effect July 1. This Plan, he said, will be the same as that in World War II but will be "open end," which provides for allotment of certain requirements with the balance on the open market and available to all.

Chairman of the Foundry Equipment & Supplies Luncheon was C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, president of FEMA, with F. B. Flynn, S. Obermayer Co., Chicago, president, Foundry Facings Mfrs. Assn., as co-chairman.

Also held at noon Tuesday, April 24, was the Malleable Round Table Luncheon, with James H. Lansing, Malleable Founders' Society, presiding, and R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., as co-chairman.

Luncheon Speaker William G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., speaking on *"Dielectric Core Baking and Its Applications,"* said the appli-

Getting together to exchange reminiscences at the President's Reception preceding official opening of the 55th Convention were these Past National Presidents of the Society. Left to right are H. Bornstein (1937-38), G. H. Clamer (1923-24), Edwin W. Horlebein (1949-50), Ben D. Fuller (1917-18), L. L. Anthes (1909-1910), Wm. H. McFadden (1907-08), and Robert E. Kennedy, Secretary Emeritus of the Society.

Participating in a general discussion of ladle refractories and their application at the Refractories Session, held in the Hotel Statler's Empire State Room on Wednesday afternoon, April 25, were Speaker Clyde Wyman, Burnside Steel Foundry Co., Chicago; Ray A. Witschey, A. P. Green Fire Brick Co., Chicago; and Session Co-Chairmen Robert P. Schauss, Illinois Clay Products Co., Chicago, and R. H. Stone of Vesuvius Crucible Company, Pittsburgh.

Earnestly discussing the steel foundryman's point of view during the Symposium on "Principles of Gating," held all day April 24, is J. B. Caine, foundry consultant, Wyoming, Ohio. The event drew the largest technical session audience in A.F.S. history.

cations of this process are broad and its future is good. Dielectric core baking, Mr. Ferrell said, began as a means for making cores for cast steel crankshafts. Cost of this method, he said averages about 30 cents per ton of cores baked.

Mr. Ferrell stressed that foundrymen must stick to basic ingredients of core baking such as sand, cereal, oil and water and exclude foreign materials. Average cost per ton of core sand, he said, is about $8.10.

Leading off the afternoon sessions following the all-day Symposium on *"Principles of Gating"* was the pattern session. Presiding at the session was Harry Lees, Whitin Machine Co., Whitinsville, Mass., with Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit, as session co-chairman. Two papers and intensive discussion of patternmaking problems were features of the session. Lead-off speaker was E. Blake, Osborn Manufacturing Co., Cleveland, who spoke on *"Design of Core Boxes and Driers for Core Blowing,"* and F. J. Oklessen, Motor Pattern Co., Cleveland, who discussed the subject, *"Design of Core Setting and Rubbing Fixtures."*

Sand session, held simultaneously, had as its co-chairmen J. B. Caine, foundry consultant, Wyoming, Ohio, and R. H. Jacoby, The Key Co., East St. Louis, Ill.

Principals in the Plant and Plant Equipment Session, held at 4:00 p.m., Wednesday, April 25, were, left to right: Co-Chairman H. W. Johnson, Wells Mfg. Co., Skokie, Ill.; Speaker Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill.; Chairman James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.; and Speaker Charles Schneider, National Malleable & Steel Castings Company.

Convention NEWS Story . . .

Discussing a topic of importance to every foundryman at the Wednesday morning Foundry Cost Session were, left to right: Co-Chairmen George Tisdale, Zenith Foundry Co., and Ralph L. Lee, Grede Foundries, Inc., both of Milwaukee; and Speakers Clyde E. McQuiston, Ohio State University, Columbus, and A. W. Schneble, Jr., Advance Foundry Company, Dayton, Ohio.

First session paper, *"Compaction Studies of Molding Sands,"* by R. E. Grim and William D. Johns, Jr., University of Illinois, described an apparatus used to study comparative compaction characteristics of Illinois fireclay, Illinois illite, Wyoming bentonite and Mississippi-bentonite bonded sands, by using varying amounts of sand, clay and water. Compaction decreased in the order fireclay, illite, Wyoming bentonite and Mississippi bentonite.

Next, a paper on *"Effect of Sand Grain Distribution on Casting Finish,"* by H. H. Fairfield and James MacConachie, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., Canada, pointed out that a high-speed sand distribution produced generally excellent physical properties. During discussion of the paper, it was brought out that without proper ramming, proper sand mixing is of little help.

Timestudy and methods session with M. T. Sell, Sterling Foundry, Wellington, Ohio, and H. R. Williams, Williams Management Engineering, Milwaukee, as co-chairman, featured the A.F.S. Timestudy and Methods Committee's *"Fatigue Data Summary—Report No. 2,"* given by M. E. Annich, National Bearing Division, American Brake Shoe Co., Meadville, Pa. In his report, Mr. Annich told of several methods of determining fatigue allowances in foundry operations. Described by the speaker were the Overall Basis, Compromise and Elemental Basis methods.

The annual get-together of the three A. F. S. Canadian chapters at the Canadian Dinner the evening of April 24 was highlighted by the appearance of two Scottish lassies who performed the Highland Fling, the Sailor's Hornpipe, and the Sword Dance to the accompaniment of bagpipers in full clan regalia. Toastmaster for the dinner was A. F. S. National Director J. J. McFadyen, Galt Malleable Iron Co.

At 8:00 p. m., the Convention's three shop courses were resumed. Brass and Bronze Sand Shop Course had as its speaker Harry W. Dietert, Harry W. Dietert Co., Detroit, who continued his discussion entitled *"Sand Control for Copper-Base Alloys."* He pointed out that A. F. S. committee findings have correlated defects with

Leading a discussion of melting and materials at the Gray Iron Round Table Luncheon, April 26, were left to right: S. A. Kundrat, Homestead Valve Mfg. Co., Coraopolis, Pa.; J. F. Dobbs, New York Air Brake Co., Watertown, N. Y.; Session Co-Chairmen A. D. Barczak, Superior Foundry, Inc., Cleveland, and C. A. Harmon, Hanna Furnace Co., Buffalo; and A. J. MacDonald, also of Hanna Furnace Co., Buffalo.

Co-Chairman O. Z. Rylski, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada, makes a few announcements during the Aluminum & Magnesium Round Table Luncheon, Monday, April 23. Listening speakers' table occupants are, left to right: Walter Bonsack, Christiansen Corp., Chicago; Co-Chairman J. W. Meier, Dept. Mines and Technical Surveys; Chairman R. F. Kramer, General Electric Co., Schenectady, N. Y.; Mr. Rylski; W. E Sicha, Aluminum Co. of America, Cleveland; and C. E. Nelson, Dow Chemical Co.

hot and retained properties and, he said, it appears that high hot and retained strength combined with high sand expansion lead to scabs, buckles, and rattails. All factors, he concluded, are influenced by molding procedure. Presiding at the session was J. R. Crain, National Bearing Div., American Brake Shoe Co., Meadville, Pa.

Gray Iron Shop Course discussion of the topic, *"Melting in a Gray Iron Reverberatory Type Furnace,"* was led by J. G. Winget of the Reda Pump Co., Bartlesville, Okla. Co-chairmen of the meeting were H. H. Wilder, Vanadium Corp. of America, Detroit, and E. J. Burke, Hanna Furnace Co., Buffalo. Mr. Winget described rapid melting of small amounts of high quality iron in a gas fired furnace.

Leading the discussion on *"Shell Molding and the Use of Resin Binders"* at the Sand Shop Course were Bernard N. Ames, New York Naval Shipyard, Brooklyn, and Warren C. Jeffery, University of Alabama. Richard H. Olmsted, Whitehead Bros. Co., New York, presided; co-chairman was Wm. D. Dunn, Oberdorfer Foundries, Syracuse, N. Y.

Wednesday, April 25

Four simultaneous technical sessions opened Wednesday's program at 10:00 a. m.—brass and bronze, foundry costs, gray iron, and sand.

First brass and bronze paper, *"Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys,"* by R. A. Colton and M. Margolis, American Smelting & Refining Co., Barber, N. J., reported study of effect of zinc, tin, lead, and nickel additions on grain size of copper-base alloys on a laboratory scale using high-frequency induction melting and slow furnace cooling practice. Lead, it was concluded, imparts some grain refinement because of its insolubility in copper but the other elements had little or no effect grain size.

G. P. Halliwell, H. Kramer & Co., Chicago, in the absence of Authors B. F. Kline and J. R. Davidson, Southern Pacific Railroad Co., Sacramento, Calif., abstracted the paper, *"Manufacture of Bronze Boiler Drop Plugs,"* which described various phases relating to the manufacture, testing, and study of fusible alloys.

Presiding at the brass and bronze session were F. L. Riddel, H. Kramer & Co., Chicago, and H. G. Schwab, Bunting Brass & Bronze Co., Toledo, Ohio.

Foundry Cost Committee session, with R. L. Lee, Grede Foundries, Inc., and George E. Tisdale, Zenith Foundry Co., both of Milwaukee, as co-chairmen, had as its opening speaker John Taylor of Lester B. Knight & Associates, Inc., Chicago, who described *"'Spec' Sheets and Their Various Uses."* Concluding session paper dealt with *"A New Method of Evaluating Costs*

Top U. S. gray iron foundrymen talk international shop with E. S. Renshaw of Ford Motor Co., Dagenham, England, who presented the Exchange Paper from the Institute of British Foundrymen at the April 26 morning Gray Iron Session. Left to right: Gosta Vennerholm, Ford Motor Co., Dearborn, Mich.; R. A. Flinn, American Brake Shoe Co., Mahwah, N. J.; Mr. Renshaw; Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.

Mrs. Theodore H. Burke, official hostess, welcomes ladies of the foundry world to the Convention at a Reception and Tea on Monday afternoon, April 23.

in Jobbing Foundries," by A. W. Schneble, Jr., Advance Foundry Co., Dayton, Ohio, and Clyde E. McQuiston, Ohio State University.

Three papers filled the gray iron session over which A. P. Gagnebin, International Nickel Co., New York, presided. Co-chairmen were T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., and W. B. McFerrin, Haynes Stellite Div., Union Carbide & Carbon Corp., Kokomo, Ind. Lead-off paper was *"Influence of Silicon Content on Mechanical and High Temperature Properties of Nodular Cast Iron,"* by Wifred H. White, Jackson Iron & Steel Co., Jackson, Ohio, and L. P. Rice and A. R. Elsea, Battelle Memorial Institute.

Mr. White reported on investigations to determine effect of variations ranging from 2.6 to 6 per cent silicon on mechanical properties, growth and scaling content of nodular cast irons. Silicon additions, he said, progressively increased hardness of the iron, and added that spheroidal cast irons containing from 4 to 5 per cent silicon were much stronger than other irons tested.

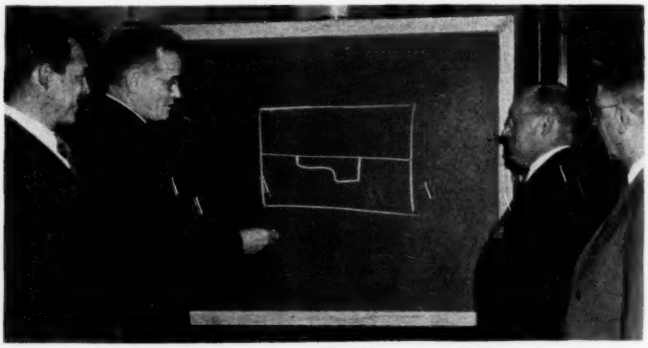
J. E. Rehder, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada, speaking on *"Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron,"* pointed out that such properties as tensile strength are little affected by phosphorus but for good impact strength and elongation, phosphorus content should be kept below 0.04 per cent. Final session paper was *"Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Gray Iron,"* presented by R. W. Heine and E. A. Lange, University of Wisconsin, in which the authors reported the effects of air oxidation of iron in various refractories, effect of temperature on composition changes, the influence of slags, iron oxide, rusty scrap, coke, and melting in CO_2 atmosphere.

Three papers presented at the 10:00 a.m. sand session were extremely well accepted by the audience: *"Metal Penetration,"* a report of the A. F. S. Mold Surface Committee by S. L. Gertsman and A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada: *"The Determination of Metal Penetration in Sand Molds,"* by H. A. Gonya and D. C. Ekey, Ohio State University; and *"Effect of Fluid Metal Pressure and Penetration Defects,"* by C. C. Sigerfoos of Michigan State College.

Interesting feature of the meeting was a discussion of the papers by J. B. Caine, consultant, Wyoming Ohio, who said the papers introduced a unique test for determining metal penetration by working from the casting toward the sand. This point was debated by many foundrymen present, who claimed that correct procedure has always been and will always be to feel sand in its green state and then correct the mixture before the defects can originate. They agreed with Mr. Caine that high temperature properties are very important, but said that the mixture in its green state must be correct and properly rammed to overcome penetration. J. H. Lowe, Wehr Steel Co., Milwaukee, and J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind., presided.

Pattern Round Table, noon, Wednesday, had as its co-chairmen Leonard F. Tucker, City Pattern & Foundry Co., South Bend, Ind., and E. T. Kindt of Kindt-Collins Co., Cleveland. W. H. Dashiell of Kindt-Collins Co. led a discussion of *"Pattern Shop Machinery and Equipment,"* in which it was stressed that the cost of up-to-date pattern machinery and supplies in the long run is not nearly that of labor required to

(Continued on Page 89)



Prominent foundry educators work out a mutual problem prior to the Monday afternoon Educational Session. Left to right: T. W. Russell, Jr., American Brake Shoe Co., New York; Prof. William H. Ruten, Polytechnic Institute of Brooklyn, N. Y.; Prof. Roy W. Schroeder, University of Illinois, Navy Pier Branch, Chicago; and Prof. George B. Barker, University of Wisconsin, Madison.

FACTORS GOVERNING SEA COAL SELECTION AND CONTROL

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Sea coal is a term used to describe any pulverized coal used in foundry molding sands. Like many other terms used in the foundry, the name was brought to this country by some of the original settlers from the British Isles and European countries. It is believed that the term orignated in the British Isles where coal is mined under the sea off the coast of Wales. Another explanation is that it was necessary to transport the coal from the mines by boat to the foundries located in England, Scotland, Europe and America.

Sea coal is manufactured by grinding or pulverizing coal using various types of mills. The fineness is controlled by screening or air flotation. Most sea coal is purchased in the ready-to-use state from producers who specialize in preparation. However, some foundries find it economical to grind their own product.

What happens in a mold, containing sea coal in the molding sand, when molten metal enters the mold cavity? A mold may be compared to a retort used for the distillation of coal to produce coke. The heat is applied by the molten metal entering the cavity. As the molten metal enters the mold, all the tempering water in the molding sand at the face of the mold is driven off and some of the coal is ignited by the oxygen from the air in the mold cavity. After all the free oxygen has been used, distillation of the coal proceeds.

First the volatile matter is driven off. This consists of the hydrocarbon gases, combined moisture, and sulphur. As more molten metal flows over the sand, the temperature of the sand rises and the tars or heavier hydrocarbons are distilled off until finally the original coal consists of fixed carbon or coke and impurities which form the ash. As a descending temperature gradient exists between the sand-metal interface and the outside surface of the mold, it follows that this distillation does not necessarily go to completion in the total mass of sand comprising the mold.

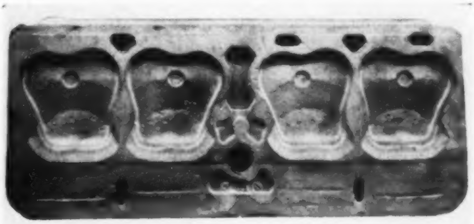
Sea Coal Distillation Sequence

These steps in the distillation of the coal occur almost simultaneously and can be noted by observing the pouring of any green sand mold in which sea coal has been used. First, steam is observed issuing from the mold, then the blue flame caused by the ignition of the water gas, which forms just as the distillation starts, is noted. Finally, the dark gases of volatile constituents appear at the mold surface.

If the sand is examined carefully after the mold is shaken out, minute particles of coke will be found. Thus there are four complete reactions taking place at the sand-metal interface during pouring of a green sand mold: (1) evaporation of tempering water; (2) distillation of volatile or gaseous matter; (3) formation of the coal tar or viscous ingredients; (4) formation of the coke. In dry sand molds, the first step has been completed before the molten metal enters the molds. These reactions have a bearing on the selection of the sea coal.

Sea coal is added to molding sand to: (1) prevent the molten metal from burning to the sand grains; (2) improve the appearance of the casting; (3) produce a more thermally stable sand; (4) control shrinkage within the casting. Of these four functions of sea coal, the first two are most widely known.

Several theories have been advanced as to the action of sea coal in preventing the sand from burning onto the casting. Perhaps the most logical explanation and the one that has the most merit is that the sea coal produces a reducing atmosphere within the mold cavity. The carbonaceous matter in the coal combines with the oxygen from the air in the mold cavity. This prevents the oxygen from combining with the molten metal. Hence the formation of the iron silicates found on the surfaces of burned-on castings is prevented.



The rough surfaces of this casting are caused by the use of excessively coarse sea coal in the facing sand.[3]

This theory is further substantiated by the fact that the amount of sea coal in a molding sand is directly dependent on the temperatures at which the castings are removed from the sand. If a casting is removed from the sand after it has cooled completely or is at a black heat, the required amount of sea coal will be less than if the casting is removed from the sand when at a red heat or barely solidified. In the latter case, there must be an excess of incandescent carbon on the surface of the casting to prevent the oxygen in the atmosphere from combining with the metal which is at an elevated temperature.

Castings made by the non-mechanized floor method are usually at a black heat before being shaken out. Castings made on continuous type conveyors, where the time cycle of the conveyor is not long enough to permit the castings to cool completely, are usually shaken out at a bright red heat. Hence castings made on a conveyor with a limited cooling cycle require more sea coal in the foundry molding sand than those made in the floor-type foundry.

It is known that it is impossible to ram a mold so

that the space between the sand grains is of microscopic size. Sea coal, by distillation and the formation of hydrocarbon gases, coal tars and coke, tends to fill the voids between the sand grains. This prevents the metal from entering the voids, thereby giving the casting a better appearance. However, it must be borne in mind that the finish of the casting is primarily a result of size and distribution of the sand grains. A fine finish cannot be produced in a coarse sand by adding sea coal, which merely acts as a limited filler.

Increasing Sand Thermal Stability

Various theories have been advanced as to the action of sea coal in making the sand more thermally stable. It is believed that when sea coal is in the stage of producing tarry hydrocarbons, it acts as a buffer and quickly fills any cracks in the face of the mold created by the contraction of the clay substance, and at the same time allows room for the silica grains to expand. Hence it acts as an equalizer for the expanding and contracting forces set up in the mold, especially at the sand-metal interface where the temperature shock is the greatest.

A great deal of work has been done in the past 10 years on the effect of sea coal on metal shrinkage. Professors Womochel and Sigerfoos[1] of Michigan State College showed that piping tendency was reduced in a casting if additions of sea coal were made to the molding sand. Other foundries and investigators have found that external shrinkage or suck-ins, especially those occurring in the cope, could be eliminated by adding sea coal to the molding sand.[2] To be effective in eliminating this defect, the percentage of sea coal should be in the neighborhood of 6 per cent or more by weight.

There have been reports of using a facing sand rich in sea coal to reduce shrink in a casting or a section of a casting. What should be the governing factors in selecting a sea coal? How uniform should the sea coal be? Sea coal should be analyzed for: (1) volatile combustible matter; (2) fixed carbon; (3) total carbon; (4) sulphur content; (5) ash content and ash fusion point; (6) moisture content; (7) fineness.

The volatile combustible matter determines the amount of gas that will be given off by the sea coal. The fixed carbon determines the amount of coke that will remain after distillation of the sea coal is complete. Total carbon is the sum of the carbon in the fixed state and in the hydrocarbons. Sulphur content shows the amount of sulphur present. Ash content indicates amount of non-combustible matter present in the coal. Ash fusion point is the temperature at which the

TABLE 1—SEA COAL SIEVE ANALYSIS OR FINENESS

U.S. Standard Sieve No.	Per Cent Retained, Maximum				
	Coarse Class 1	Medium Class 2	Medium Fine Class 3	Fine Class 4	Extra Fine Class 5
20	5.5	Trace	0.0	0.0	0.0
40	40.0	12.0	6.0	Trace	0.0
100	50.0	35.0	30.0	15.0	1.0
200	18.0	35.0	25.0	30.0	10.0
Pan	9.0	40.0	50.0	65.0	95.0

Proximate Analysis

Moisture	1.5% Max.
Volatile Combustible Matter	35.0% Min.
Fixed Carbon	50.0% Min.
Ash	5.5% Max.
Sulphur	1.0% Max.

ash will fuse or clinker. Moisture content shows the amount of surface or uncombined moisture present in the coal.

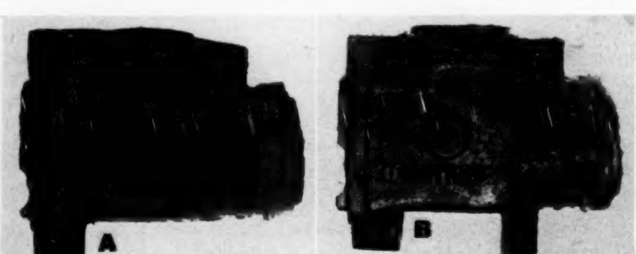
Fineness indicates the fineness to which the coal has been ground and its particle-size distribution. Suggested specifications for the purchase of sea coal are shown in Table I. These specifications cover sea coals used to make castings weighing from less than one ounce to over 500 lb.

Under these specifications, the proximate analysis of the coal is essentially constant. Hence any control of the amount or rate at which the gas is produced must be obtained by varying the percentage of sea coal in the sand and the fineness of the sea coal. The size of the coke particles remaining in the sand will be determined by the fineness of the sea coal. Other materials may be added to increase the amount of gas or coke which will be produced. Some of the common materials used are fuel oil, gilsonite, pitch, wood flour, cereal, rosin, and graphite.

The following factors should be taken into consideration when determining the necessary quantity of sea coal in the sand and the fineness of the sea coal:

1. Grain fineness of the sand and its distribution.
2. Weight of the casting.
3. Surface area of the casting.
4. Cross-sectional area of the casting.
5. Pouring temperature of metal.
6. Method of molding.
7. Temperature of castings at shakeout.

The grain fineness of the sand should be the primary determining factor in selecting sea coal fineness. Theoretically, a molding sand containing sea coal consists of silica grains coated with a clay bond, the clay bond being impregnated with the sea coal. To impregnate thoroughly the clay bond around individual silica



Two valve body castings were made in the same mold, gated the same way, and poured through a common sprue from the same ladle of iron. Casting (A), made in the line sand, has a deep cavity in the boss (upper left-hand corner). Casting (B), made in sand containing southern bentonite and sea coal, is sound (W. F. Bohm[2]).

Three test castings poured in experimental sand molds showed less metal shrinkage with increasing sea coal additions. No. 10 had a 2 per cent addition by weight; No. 11 a 4 per cent addition; and No. 12 a 6 per cent addition (Sanders and Sigerfoos[2]).

grains, the sea coal should be finer than the silica grain. The size of the coke particles—final product of sea coal distillation—is dependent upon the fineness of the sea coal and is not advisable for the coke particles to be larger than the silica grains. Generally speaking, the sea coal should be finer than the silica grains.

The surface area and cross-sectional area of the casting should be taken into consideration because of the possibility of cold shuts or misruns. The amount and rate at which gas will be produced are dependent upon the percentage and fineness of the sea coal in the sand. Hence, for thin-walled castings the percentage of sea coal in the sand should be held comparatively low, generally under 6 per cent. However, this may vary with the pouring temperature of the metal. In other words, if the pouring temperature is comparatively high, the amount of sea coal can be increased without danger of misruns or cold shuts.

Prevent Buckles and Scabs

On castings with large surface areas, the binding actions of the coal tar and coke are necessary to prevent buckles or scabs. This may be accomplished by increasing the percentage of sea coal, by using a coarser grade of sea coal, or by the addition of other additives which produce more coal tar and coke.

As previously explained, a distillation of the sea coal takes place in the molding sand. This distillation process requires heat. The source of heat is the molten metal. Thus, the temperature of the sand in the mold at the sand-metal interface is prevented from becoming excessive. The metal is also chilled because the heat is extracted faster by the distillation process than by conduction, radiation, or convection, which are the ordinary means of extracting heat from the metal.

Castings of average surface area but large cross-sectional area have been made by using sands containing sea coal in excess of 15 per cent. In these cases a sand with exceptional thermal stability is produced. All buckles and scabs are eliminated.

The weight of the casting enters into the selection of the sea coal because heavy castings usually have sections with a large weight of metal concentrated in a comparatively small area. Here, resistance to the metal pressure must be obtained primarily from the coke; therefore, this type of casting is made in a comparatively open or course sand. The voids between the grains are larger and a coarser sea coal should be used to insure larger coke particles. In the case of the heavy or large casting, the coke is used to resist metal penetration, while in the light casting made in the finer sand the gas from the sea coal will resist the metal penetration.

The method of molding must be considered in selecting the fineness and amount of sea coal in the molding sand because various molding methods produce various hardnesses on the mold face. A molding method which produces a comparatively soft mold face requires a larger amount of coarser sea coal than a method which produces a hard, uniform mold face.

The temperature at which the casting is shaken out, as previously explained, is another factor in determining the amount of sea coal in the sand. In this case the fineness of the sea coal is not a determining factor. If the amount of sea coal required for a casting shaken out at a black heat is 6 per cent, a casting shaken out at a red or bright red heat should be made in a sand containing 8 to 10 per cent of sea coal.

Summary

1. Sea coal is added to molding sands to: (a) prevent burn-on; (b) improve appearance of castings; (c) make a more thermally stable sand, thereby eliminating scabs, buckles, etc.; (d) control metal shrinkage.

2. Chemical analysis of the sea coal is controlled by the producer.

3. Chemical analysis of the sea coal should be controlled within previously determined limits.

4. Fineness should be held within reasonable limits for any grade or class of sea coal.

5. Fineness of the sea coal used in a molding sand is dependent upon the fineness of the molding sand.

6. The average proportion of sea coal in molding sands will vary from less than 5 to about 15 per cent, depending upon the type of casting. Cases have been reported where much higher percentages were used.

References

1. H. L. Womochell and C. C. Sigerfoos, "Influences of the Mold on Shrinkage in Ferrous Castings," A.F.S. Transactions, vol. 48, pp. 591-622 (1940).

2. W. F. Bohm, "Mold Materials Are Factors in Gray Iron Shrinkage," American Foundryman, Jan. 1951, p. 26; and C. A. Sanders and C. C. Sigerfoos, "Gray Iron Shrinkage Related to Molding Sand Conditions," American Foundryman, Feb. 1951, p. 49.

3. Analysis of Casting Defects, American Foundrymen's Society, Chicago, 1st ed., 1947.

Future Meetings and Exhibits

Sand School, Harry W. Dietert Co., at Engrg. Soc. of Detroit Auditorium, Detroit, Aug. 20-22.

International Foundry Congress, Brussels, Belgium, Sept. 10-14.

German Foundrymen's Society, 42nd general meeting, Dusseldorf, Germany, Sept. 28-29.

Michigan Regional Foundry Conference, sponsored by A.F.S. Detroit, Central Michigan, Saginaw Valley, Western Michigan Chapters, and Michigan State College Student Chapter, at Michigan State College, East Lansing, Mich., Oct. 11-12.

Texas Regional Foundry Conference, sponsored by A.F.S. Texas Chapter, and Texas A. & M. Student Chapter, Shamrock Hotel, Houston, Texas, Oct. 19-20.

MODERN FOUNDRY METHODS...

STRAIGHTEN MALLEABLE IRON CASTINGS

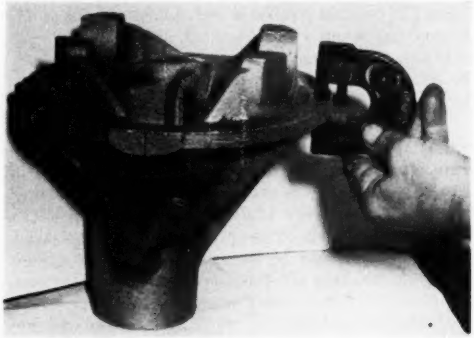
Inspection and straightening methods employed in a malleable foundry producing automotive castings are presented here in outline form from the paper "Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings," by Leslie N. Schuman, National Malleable & Steel Castings Co., Cleveland, presented at the 55th A.F.S. Annual Meeting, at Buffalo, April 23-26, 1951.

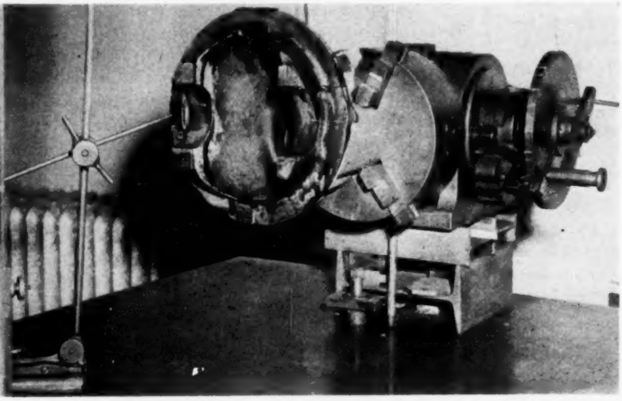
Customer demands for dimensional accuracy in castings have outmoded previous concepts of inspection and straightening. Gages have been developed which are exact duplicates of the customer's first operation setup, and with sufficient tolerance targets and limits to assure detection of dimensional deviations which would result in machine scrap.

The procedure followed in producing differential carrier castings of the type shown is: the pattern is checked and mounted in the foundry on a regular production setup. Five or ten castings are poured under actual production conditions, the castings are thoroughly shot blasted, and two sets are used to make a complete layout.

A milling machine dividing head equipped with a three-jaw universal chuck enables the layout room to make a complete check of the casting in all planes from a single setup. Any deviations are reported to the foundry and patternshop for corrective measures.

The other test castings usually are broken for a check on physical defects such as shrink and porosity. When samples of satisfactory dimensional accuracy are available, one set is sent to the customer for approval, and several are annealed for trial in the straightening dies.

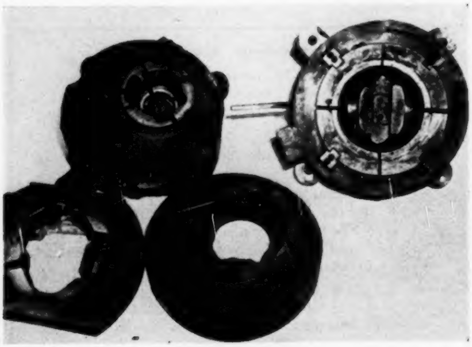




A typical differential carrier casting is checked for flange dimension with an adjustable snap gage, set to tolerances of customer's specifications and accuracy necessary for proper functioning of straightening dies.

In the layout room the differential carrier casting is mounted on a milling machine dividing head with a three-jaw universal chuck, enabling a complete check in all planes to be made from a single setup.

Left, below—Dies for the differential carrier casting are designed for easy maintenance. Below—Bearing legs are gaged by means of a template.



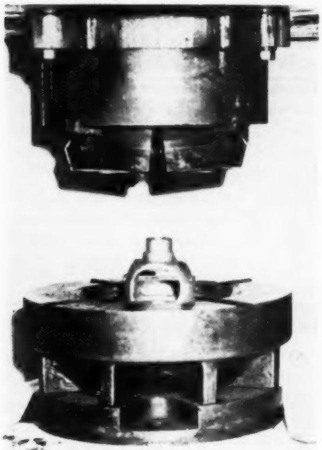
...MODERN FOUNDRY METHODS

When the pattern is put into production the trimming department periodically breaks several castings each day for a check on shrinkage and porosity. On large production jobs, such as the differential carriers, quality control charts are maintained (ten castings per shift).

All differential carrier castings are checked for cope to drag dimension by use of an adjustable snap gage on the flange. The snap gage is set to tolerances of the customer's specifications and the casting accuracy necessary to provide for proper functioning of the straightening dies.

After annealing, grinding, chipping and shot blasting the castings are straightened in hydraulic presses of 500- to 1000-ton capacity. Output is 300 to 500 per

One - piece differential gear case casting is checked with a core set gage which also includes a flange thickness gage.



A typical differential gear case die in which shift and runout removal are effected by the top loose pieces, thus avoiding dirt troubles encountered when loose pieces are at the bottom of the die.

The gear case casting is mounted in a fixture similar to the customer's first operation. A rotating finger gage is used to check eccentricity.

hour, depending on the travel required to load and, at high pressure, to close the loose die pieces.

The dies used have loose pieces assembled inside of standardized holders. The top die has contracting loose pieces to grasp the outside diameter of the flange and the outer section of the cross bore bearing legs, and expanding loose pieces that contact the inner side of the cross bore bearing legs. The bottom die is composed of a holder for the contracting loose pieces. Above this is a combination spacer and stop for bottom loose pieces, on top of which is a pressure plate. This provides for easy maintenance of dies and individual replacement of worn die pieces.

Each time a die is mounted, or every 8 hr, whichever is first, 100 pieces are gaged in a fixture that duplicates the customer's first operation. The points gaged are cress bore bearing legs by means of a template, clearance for pinion boring bar, and the pinion bore end or stem. The pinion end is gaged with a "go and no go" rotating finger gage calibrated to assure sufficient wall section after machining.

The same checking and proving procedure used for the differential carrier is followed for another production casting—a one-piece differential gear case. A core set gage, which includes a flange thickness gage, is used to check the position of the core up and down.

Straightening dies for gear case castings are so designed that the entire effort to remove shift and runout is taken by the top loose pieces. This type of die is rather free from the dirt troubles encountered when the loose pieces are in the bottom die.

Inspection, as on the carrier, includes a periodic 100 per cent gage operation in a fixture similar to the customer's first operation. A rotating finger gage is used to check eccentricity.

Die materials vary from low-carbon steel carburized to high-carbon alloy tool steels, the selection depending upon the application. Torsion, compression, tension, shock and hardness must be considered. Angles used on the loose pieces are varied, depending upon the pressure and the amount of effective travel.

The complete paper and discussion will appear in A.F.S. TRANSACTIONS, vol. 59, 1951. Another paper, "Dies for a Malleable Production Foundry," by K. L. Sanders, was published in the Aug., 1950 issue of AMERICAN FOUNDRYMAN.

BENTONITE BONDING PROPERTIES AFFECTED BY DRYING TEMPERATURE AND MOISTURE CONTENT

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and
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BENTONITE HAS BEEN USED to bond foundry molding sands for many years, and a great deal has been written about its properties and characteristics as a bonding agent. It is the purpose of this paper to explore the effects of drying temperatures and moisture contents in an attempt to explain possible variations in its use. The subject of the work is limited to the so-called western bentonites, or those commonly mined in the states of South Dakota and Wyoming.

To fully appreciate the nature and influence of drying temperatures and moisture contents on foundry bentonites, it is necessary to know something of the conditions under which bentonite is mined and processed. Bentonite does not occur naturally in huge, continuous deposits similar to limestone, but in small, relatively isolated deposits containing variable tonnages of usable clay. These are carefully mapped, stripped, and mined on the basis of drill hole samples and complete laboratory tests.

Huge stockpiles of acceptable bentonite are built up, blending bentonite from many deposits in such a manner as to insure a uniform raw material for processing. Stockpiling is necessary mainly because the mining is seasonal. The care and attention given these operations largely determine the quality of the bentonite. Processing ordinarily consists of crushing, drying, and grinding. Of these operations, drying is the most critical.

The same testing procedure was used throughout this work. All molding sands were prepared by mixing 2000-gram batches containing 4 per cent bentonite, either on a "dry basis" or "as-received" as noted, 96 per cent Del Monte sand, and variable moisture contents. The bentonite and sand were mixed dry for 2 min, water added and mixing continued for a total of 7 min. Strength values are given for 2 per cent tempering water in all cases.

Drying Temperature Effect

Different portions of the same sample of bentonite, original moisture content 24.2 per cent, were heated to dryness in a controlled muffle furnace set at variable temperatures. Molding sands were prepared and tested, using the resulting dried samples. The results are shown in Table 1. It is indicated that bentonites can be heated to total dryness at temperatures as high as 400C without harming either green or dry compression strength properties. Dry strength appears to be slightly more sensitive to higher temperatures than green strength in that it begins to decrease at 450C, whereas green strength does not. At temperatures as high as 600C both green strength and dry strengths are affected.

Another sample of bentonite was divided into representative portions and heated at 70C to varying moisture contents. Molding sands were prepared and tested using 4 per cent of these samples on a dry basis. The results of these tests are given in Table 2. They show that when the bentonite is added on a dry basis, relatively the same strengths are obtained, regardless of the moisture content.

However, it is customary to add bentonite in an "as-received" condition to most sand mixes. Practically speaking, for each one per cent increase in moisture content, an additional one per cent of bentonite must be added to maintain the same strength. This means that if a particular mix requires 200 lb of bentonite, containing 4 per cent moisture in an "as-received" condition, to obtain a certain desired

TABLE 1—EFFECT OF DRYING TEMPERATURE ON BENTONITE BONDING PROPERTIES

Drying Temperature, C	Drying Time, hr	Compression Strength, psi* Green	Dry
105	6	6.85	46.0
150	7	6.75	46.0
200	2	6.90	49.0
250	2	6.75	50.0
300	2	6.85	47.5
350	2	6.80	45.5
400	2	6.65	43.5
450	2	6.60	28.0
605	2	4.97	11.0

* 4 per cent bentonite used, dry basis.

strength 208 lb of a bentonite with 8 per cent moisture will be required in order to obtain the same strength. This increase in moisture content from 4 to 8 per cent could easily occur in storage (Table 2).

In connection with the above work, samples of bentonite completely dried at 105C were subjected to conditions of different humidities. These samples were tested from time to time to determine their moisture contents. Table 3 shows the results. Equilibrium moisture contents obtained for the different humidities are shown in Table 3.

In addition to determining the equilibrium moisture content (Table 3), the variation in moisture content of bentonite stored in three different cities was investigated. Portions of the same sample of bentonite were supplied to laboratories in Houston, Tulsa, and Los Angeles, and moisture content determinations were made at regular intervals over a period of 6 weeks. The samples were contained in double-wall paper bags.

The moisture content of the bentonite when sup-

TABLE 2—EFFECT OF MOISTURE CONTENT ON BENTONITE BONDING PROPERTIES

Drying Temperature, C	Moisture As Tested, %	Compression Strength, psi* Green	Dry
70	0.00	6.05	50.0
70	3.5	6.25	48.5
70	10.0	6.10	52.0
70	12.4	6.00	50.0
70	15.0	6.30	54.0

* 4 per cent bentonite used, dry basis.

Table 3—Humidity and Equilibrium Moisture Content of Bentonite

Relative Humidity, %	Equilibrium Moisture Content, %
25	2.0
38	4.0
48	6.0
56	8.0
64	10.0
71	12.0

plied was 7.7 per cent. During the testing period variations were noted as follows: Tulsa, 3.56 to 8.91 per cent; Houston, 8.40 to 9.30 per cent; and Los Angeles, 7.59 to 8.65 per cent.

One of the most critical steps in the processing of crude bentonite is that of drying. The temperature at which the bentonite is dried and the resultant moisture content can have a great influence on its properties as a foundry molding sand bond. Table 1 shows that if all of the bentonite is dried at a temperature as high as 450 C its dry compression strength will be decreased, and if the temperature is as high as 600C both green and dry strengths will be harmed.

In actual plant practice it is customary to dry the bentonite to some specified moisture content. The exhaust gas temperature of the dryer may vary from 90 to 150 C, depending upon the original moisture content of the bentonite and the rate of drying, while the firebox temperatures may be as high as 1100 C. Under these conditions, if all of the bentonite was dried to zero moisture content its bonding properties would suffer. Consequently, it is desirable to specify some moisture content which, with a reasonable production rate, will afford a uniform product with the most optimum properties.

Table 3 shows that at a relative humidity of 56 per cent, the equilibrium moisture content of bentonite is about 8.0 per cent. If bentonite as produced contains a higher or lower percentage of moisture, it will, upon standing in an atmosphere of 56 per cent relative humidity, ultimately attain this moisture content of 8 per cent.

The tests made in the different cities indicate the variations that might be expected under different conditions. On the basis of these results and those given in the foregoing, it is believed that a moisture content of about 8 per cent is the most desirable at which to produce bentonite. Such a moisture content allows reasonable production capacity without danger of harming the bentonite.

In addition, it provides a bentonite which will be the most uniform under average conditions of storage. This latter point is of particular importance to the foundryman, since in almost all foundries bentonite is added to a sand without consideration of its moisture content. If its moisture content varies, the resulting green and dry strength properties will also vary. Consequently, bentonite having an original moisture content which will not vary greatly under average humidity conditions is most important. A moisture content of about 8 per cent appears to fulfill these requirements.

OVERSEAS FOUNDRY TEAMS SEE U. S. METHODS

Danish foundrymen touring United States foundry centers under the auspices of the Economic Cooperation Administration not only visited foundries but participated in several meetings of A.F.S. groups. In the country from March 1 to April 5, the nine-man group studied some 11 foundries and held discussions with foundrymen in a dozen cities. A scheduled feature of the tour was the Ohio Regional Foundry Conference sponsored by the five Ohio chapters of the Society. The team also attended the March meeting of the Western New York chapter where the technical speaker, J. B. Caine, Wyoming, Ohio, discussed *"Gates and Risers."*

Leader of the team was Steffen Holmblad, H. Rasmussen & Co., Odense, Denmark. Project manager for ECA was N. E. Philpot, Washington, D.C. Primary objective of the Danish team was to study production, methods, and equipment used in U.S. gray iron, steel, and malleable iron foundries, and to apply the knowledge gained to increase the efficiency and productivity of Danish foundries.

Earlier, the Belgian foundry team of 11 men visited a dozen foundries in New England, the Midwest, and Virginia. As in all ECA teams, the members were chosen to represent management, technical, and labor phases of foundry operations. Here from January 16 to February 20, the team members hoped to be able to pick up ideas which would aid materially in raising Belgium's foundry operations from 75 per cent of capacity to full production. The project was managed by Leslie A. White of ECA; the team leader was Jean E. Lefevre, Robinetterie Nationale Eug. & Jean E. Lefevre Iron Foundry, Gilly, Belgium.

While in Chicago, the Danish and Belgian teams heard talks by A.F.S. National Office representatives and by Chicago foundrymen. The Society cooperated, along with other foundry organizations, with ECA in planning the tours.

To study administration, layout, plant methods, and operating conditions in the American zinc and aluminum die casting industry, a British team of 17 members is spending the period from May 14 to June 26 visiting plants in Trenton, N.J., Syracuse and Fayetteville, N.Y., Cleveland, Toledo, and North Canton, Ohio, Chicago, and Adrian, Mich.

Project manager is Julius Demeter; team leader is Charles R. Lyons, Imperial Smelting Corp., London.

Members of Danish Foundry Team photographed by Thomas W. Gallagher, Lake City Malleable Co., Cleveland, at the 1951 Ohio Regional Foundry Conference.

ABSORBING the TECHNICAL

An unusual training program for shop men and recent college graduates is described in this paper presented at the Educational Dinner during the A.F.S. Annual Convention in Buffalo. Described are methods of preparing men for foundry supervisory positions. The paper is part of an AMERICAN FOUNDRYMAN series on securing, training, and using men in foundry management. First two articles appeared in the April and May issues.

DURING THE PAST 35 YEARS, American industry has operated under three different sets of conditions—peace, war and preparation for war. American industry has met successfully the widely varied economic and military demands imposed by these conditions.

This ability to produce anything, and everything, in staggering quantities, at top speed and under always changing and always growing plans, is what we have come to call "American know-how." It is a compound of brains, the cool judgment of mature experience, the imagination and courage of youth and the tireless energy of American men and women defending and maintaining a standard of living—a way of living—never enjoyed by any other people.

The foundry industry has not lagged behind in the development of "know-how." For instance, forward-looking management has for a long time recognized the vital importance of the management group in any successful operation. But, for a long time, foundrymen were like the people of whom Mark Twain wrote, who "complained about the weather, but hardly ever did anything about it."

Need Management Continuity

It is well known that labor, equipment, and materials are of little value without management thought and direction. Also, it is well known that the membership of any management group is subject to losses as inevitable as death and taxes. Illness, accident, the toll taken by the passing years, the greener grass in some distant field of work, the unexpected and unexplainable sudden failure of a man to measure up to the demands of his job—all these continually threaten the continuity of management policy and practice.

When these losses occur there should be, and frequently is, a man in the organization trained and ready to take his place. But this man's promotion means that his former place must be filled. How and by whom? Not by raiding some other concern within the industry, a procedure frowned upon by polite foundry society—especially by those raided. The foundry industry answered with another question. Why not recruit replacements from trainees within the respective plants?

A successful organization, built to withstand the ravages of time and to keep abreast of modern techniques, cannot afford to be without a trainee program. For instance, when suddenly forced to bring in an untrained supervisor from the outside or step up an inexperienced man from within, serious personnel problems can result—even to the extent of strikes. Often such dislocations are much more costly than the annual expense of any trainee program. Furthermore, obsolescence in foundry methods and equipment point up the necessity for injection of new blood, technically trained to wrestle with such problems. These facts are equally true whether the firm is small or large.

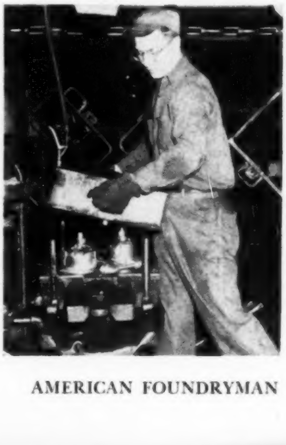
How many trainees should be added each year? Most firms have one member of management to approximately 15 employees and historical figures show that management mortality is in the neighborhood of 10 to 12 per cent per year. As an example, a company employing 600 people might have approximately 40 members in the direct management team. If 10 per cent were lost each year, it would mean, by allowing for some shrinkage within the trainee group itself, an addition of 6 to 7 trainees each year. This generalization may vary with different companies dependent upon factors such as the average age of individuals in the management group, etc.

The two main sources for recruitment of excellent material for trainee programs are:

1. Mechanical, industrial, electrical, and metallurgical graduates of engineering colleges throughout the country, particularly those who have had some summer work experience and the opportunity to attend engineering schools which are members of the Foundry Educational Foundation. In a relatively short period of three years the Foundation has made available to our industry some 300 young graduate engineers, who have been trained in foundry techniques.
2. Qualified individuals selected from the company's own work force.

It is the practice in the author's company to balance the trainee program with an equal number of college graduates and practical shop men. In close association, the college graduate trained in theory, but without much actual work experience can learn much from the practical shop man. Conversely, the shop man can pick up much knowledge from the college trained engineer. This combination is also an inspiration to capable young men who are excellent employees but who have not had a college education.

Do not expect the graduate engineer to come to the foundry after June graduation looking for a job. Statistics show that for the next few years there will be



Frank Tobakos, whose father worked in a foundry for 36 years, molding during his trainee days at Albion Malleable Iron Co. He started at Albion Malleable, where he is a foreman, after graduation from Rensselaer Polytechnic Institute in 1949.

TRAINEE

Collins L. Carter
President
Albion Malleable Iron Co.
Albion, Mich.

In this group of Albion Malleable trainees, left to right are John Kruse, Assistant Purchasing Agent Donald Rice (on special assignment), Charles Kozak, Thomas Bentley, and Edward Wright. Their program gives them actual work experience in all major foundry departments.

relatively few graduate engineers who have had the advantages of the Foundry Educational Foundation or of summer foundry work experience. The Foundry Educational Foundation periodically places in the hands of its members a list of prospective graduates. Personal contact with the students and placement officers of the universities is generally made several months before graduation. Often the students make company financed plant visitations. At these plant interviews, some companies require prospective employees to take a battery of psychological tests which measure mental ability, social intelligence, and certain personality traits.

Training Programs Differ

In the foundry industry there seems to be a wide variation in the type and duration of trainee programs; however, each program has as its goal the practical development of the trainee to undertake supervisory responsibility. Various trainee programs extend over a period of six months to two years. In some cases, the degree of previous experience of the individual governs the length of this period.

Some big companies where larger groups of trainees are employed, have a program embracing rather rigid and definite schedules. For instance, in one company the practical experience consists of 20 weeks spent in the core, melting, and foundry departments and in scrap elimination (four weeks each) and in the annealing and the inspection departments (two weeks each). Twice each week this practical training is augmented by a two-hour class of theoretical training in: job of first line management, organization structural policies and procedures, department functions and inter-relationships, management skill in working with people, management skill in job training and job improvement.

In smaller companies a more flexible program can be employed. One company which has only five or six trainees at a time sets up training programs which generally adhere to the following schedule:

1. Initial indoctrination in all departments, including administrative for overall conception of the business. 2 weeks.
2. Assignment to various operating departments for work experience. 12-36 weeks.
3. Reorientation. One week.
4. Engineering department with assignment of specific projects to get experience in organization of effort and to develop a feeling of accomplishment. 12-36 weeks.
5. Reassignment to certain operating departments for minor supervisory experience. 3-12 weeks.
6. Permanent assignment to one of five divisions of the company.

Total time for the program is 8 to 22 months. The time spent in each assignment is dependent upon the previous experience, ability, and progress of the individual trainee.

In this same plant, a Committee on Trainees is responsible for all trainees and training programs. The committee consists of the manufacturing manager, works manager, chief engineer, and personnel director. For every trainee a rating report is prepared weekly by his supervisor. The committee periodically reviews these reports. Also, each week the trainee turns in a written report to the committee. The trainee's report may include any observation or comment whatsoever that he wishes to make in respect to his work.

Stress Actual Work Experience

It should be noted that in the curricula of these two training programs *actual work experience* is heavily emphasized. The value of actual work experience lies in teaching the trainee how to use his hands. Regardless of the degree of mechanization in this country, at one stage or another everything we have is made with somebody's hands. Further, if the trainee knows what work is, he can later determine who much work it is reasonable to expect from a man and the trainee will command more respect from the people whom he will presumably someday supervise.

An essential phase of training which must not be overlooked is learning how to get along with people by leading them. The Simon Legree has no place in today's American industry. The trainee must learn that driving will not yield the required results. He must also recognize the importance of intelligent cooperation with all. These points should be stressed throughout any curriculum.

Under all conditions, it is extremely important that a trainee placed on any phase of the program, not be forgotten by management. If the individual is progressing satisfactorily, he should be recognized and encouraged. Conversely, if it is noted that a trainee is not progressing, additional attention should be given his shortcomings. However, a danger must be pointed

out that too much recognition and too much attention can have an adverse affect on the trainee or on the attitudes of others toward him, particularly on the part of those employees who have not had formal training and the advantages of a technical engineering education. "Hot shot" attitudes can be and must be prevented. In justice, if it is apparent that a trainee is not suited for the foundry industry or does not fit in the organization, it is only fair that management advise him accordingly, and the sooner the better for all concerned. He should be given an opportunity to seek employment elsewhere.

Another important factor in the success of any trainee program is the working agreement and practical acceptance of this program by the union. If some trainees have been picked from the ranks of the union, reaction to the program is much more favorable. It is recommended that an understanding be reached previously to the installation of a trainee program. This understanding should be included in the labor contract. The trainee must have some production work experience. The greatest stumbling block is the amount of replacement of direct or indirect production workers who are members of the union. One company had written into its labor contract that the number of trainees on production work at any one time could not exceed one per cent of the factory payroll.

At the completion of the training program, every trainee has for his goal a permanent assignment as a supervisor or technician in the division of the business in which he is best suited. This assignment is often influenced by openings available at the time. Often, due to emergencies, the permanent assignments are made before the training program is completed. In any case, after permanent assignment the responsible executive of the division should see that a certain amount of training is continued. With such an adequate and well-rounded training program, the company will have a thoroughly trained supervisor whose abilities will assure him of consideration for further promotion.

Melting, Solidification Temperatures Are Not Identical, Scientists Claim

Disproving the widely-accepted theory that the melting and solidification points of a metal are identical temperatures are claims of General Electric Laboratory metallurgists, who have discovered that the solidifying points of metals are far lower than previously believed —lower than melting points—textbooks to the contrary.

The reason for the long-standing theory of identical melting and solidification points is that the barest trace of impurities makes molten metals freeze at temperatures above solidification points for pure metals, according to G-E scientists.

In the G-E Laboratory, pure metal specimens, not found in nature, are achieved by dividing nearly-pure samples into tiny droplets, some of which are by chance pure. Attached to a special microscope is a temperature-controlled metal chamber with a quartz window through which the number of solidifying droplets can be counted as the temperature is lowered.

Eastern Canada Chapter Holds A.F.S. Building Fund Raffle

Members of this committee were responsible for the success of a raffle which raised $300 for the A.F.S. Building Fund at Eastern Canada Chapter's March Meeting. They are, left to right: W. C. Rowe, Crane, Ltd.; Philippe Gendron, Crane, Ltd.; Richard B. Whiting, LaSalle Coke Co.; Chapter Chairman L. Guilmette, Canadian Foundry, Supply & Equipment, Ltd.; M. E. Fee, Canada Starch Sales Co.; Lindsay Cooper, James Robertson Co., Ltd.; George R. Ewan, Dominion Engineering Works, Ltd.; James G. Dick, Canadian Bronze Co., Ltd.; Lucien Larose, Robert Mitchell Foundry Co.; and Lucien Beaudry, of Warden King, Ltd.

Lafayette College

FOUNDRY OPEN HOUSE

University of Idaho

AT THREE ENGINEERING COLLEGES REVEALS PUBLIC'S INTEREST IN METAL CASTING ART

FOUNDRYMEN AND THE PUBLIC were recently guests at foundry open houses held by three of the nation's engineering schools—University of Illinois, Navy Pier Branch, Chicago; Lafayette College, Easton, Pa., and the University of Idaho, Moscow, Idaho.

As reported by Student Kenneth Nerius, the University of Illinois Navy Pier Branch foundry laboratories' open house on April 11 and 12 drew a crowd of some 5600 Chicagoans, who watched students pour heats of cast iron and aluminum, make cores, mold and clean castings. Metal was melted in a direct-arc furnace and a gas-fired crucible furnace and molding was done on jolt-squeeze and hand-squeeze machines. A feature of the work was the complete mechanization of the system by use of sand elevators and roller conveyors. Following this, visitors watched baking of cores in an electric oven and cleaning of souvenir cast iron paperweights. The entire demonstration was put on by student members of ASME under the direction of Prof. R. E. Kennedy, Secretary Emeritus of A.F.S., and Prof. Roy W. Schroeder, chairman, A.F.S. Apprentice Contest Committee.

Lafayette College's foundry open house, the first of its kind in school history, had as its guests foundrymen of the Easton, Pa., area and Philadelphia and South New Jersey. Prof. Wylie J. Childs welcomed the foundrymen, who were then taken on a tour of the recently renovated foundry laboratories. Also featured on the program was a talk by Harry H. Kessler, Sorbo Mat Process Engineers, St. Louis, on the *"Metallurgy of Cast Iron."*

At the University of Idaho's recent open house, foundry students under the direction of Prof. Norman F. Hindle, former A.F.S. Technical Director, rammed molds, melted and poured metal, cut gates and machined and finished castings. Metal used in making castings, which are a project for Mechanical Engineering Laboratory Course No. 2, is melted from scrap aluminum pistons and presents a difficult problem in deoxidation and gas elimination.

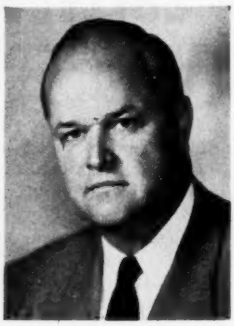
Students finishing and pouring molds during foundry open house at University of Illinois, Navy Pier Branch, Chicago. Wide-eyed young lady evidently mistook proffered souvenir frying pan for a cast iron lollipop.

FOUNDRY ORGANIZATIONS ELECT 1951-52 OFFICERS AND DIRECTORS

ELECTION OF 1951-52 OFFICERS and directors has recently been announced by three national foundry organizations—the National Castings Council, the Foundry Educational Foundation and the Non-ferrous Founders' Society.

Elected president of the National Castings Council, an organization made up of elected officers of the nation's principal foundry technical and trade associations, is C. V. Nass, vice-president, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, president of the Foundry Equipment Manufacturers Association. Mr. Nass succeeds Edwin W. Horlebein, president, Gibson and Kirk Co., Baltimore, Immediate Past President of A.F.S.

C. V. Nass



A. V. Martens

C. B. Schneible

J. D. Zaiser

New vice-president of the National Castings Council is A. V. Martens, president, Pekin Foundry & Manufacturing Co., Pekin, Ill., president of the National Foundry Association. Re-elected treasurer and secretary of the Council, respectively, are F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland, and Frank G. Steinebach, vice-president, Penton Publishing Co., Cleveland.

Heading the Non-Ferrous Founders' Society's 1951-52 slate of officers is President J. D. Zaiser, Ampco Metals, Inc., Milwaukee. First vice-president of the Society is L. H. Durdin, Dixie Bronze Co., Inc., Birmingham, Ala., and second vice-president is Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, Indianapolis.

FEF Names Officers, Trustees

Foundry Educational Foundation's roster of 1951-52 officers and directors is headed by Claude B. Schneible, Claude B. Schneible Co., Detroit, elected chairman of the Board of Directors, and John M. Price, Ferro Machine & Foundry Co., Cleveland, president.

Marion J. Allen, American Steel Foundries, Chicago, was named vice-president, and Charles A. Barnett, Foundry Equipment Co., Cleveland, secretary-treasurer. George K. Dreher was again named by the Foundation to serve as its executive director.

Trustees named to represent founding member societies are:

American Foundrymen's Society—Garnett P. Phillips, International Harvester Co., Chicago, and Fred J. Walls, International Nickel Co., Detroit. Malleable Founders' Society—Anthony Haswell, Dayton Malleable Iron Co., Dayton, and Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.

Gray Iron Founders' Society—John M. Price, Ferro Machine & Foundry Co., Cleveland, and W. R. Tanner, Zenith Foundry Co., Milwaukee.

Foundry Equipment Manufacturers Association—Claude B. Schneible, Claude B. Schneible Co., Detroit, and Charles A. Barnett, Foundry Equipment Co., Cleveland.

Non-Ferrous Founders' Society—H. A. White, Smeeth-Harwood Co., Chicago, and Thomas H. Belfield, Cochrane Foundry Co., York, Pa.

Steel Founders' Society of America—M. J. Allen, American Steel Foundries, Chicago, and Homer Tielke, Crucible Steel Casting Co., Inc., Cleveland.

Named FEF Trustees at Large are: James H. Smith, Central Foundry Div., GMC, Saginaw, Mich.; B. D. Claffey, Acme Aluminum Alloys, Dayton; Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham; G. J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn.; Frank C. Riecks, Ford Motor Co., Dearborn, Mich.; Stowell C. Wasson, National Malleable & Steel Castings Co., Cicero, Ill.; Frank H. Bonnet, Buckeye Steel Castings Co., Columbus; Edward C. Hoenicke, Foundry Div., Eaton Mfg. Co., Vassar, Mich., and Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, Ohio.

Newly-appointed Advisory Committee chairmen for FEF schools are: Albert L. Hunt, National Bearing Div., American Brake Shoe Co., St. Louis, Missouri School of Mines; FEF Trustee M. J. Allen, for Illinois Institute of Technology; and Bruce L. Simpson, National Engineering Co., Chicago, for Northwestern Technological Institute.

COLORIMETRIC ALUMINUM DETERMINATION IN TITANIUM-BEARING STEELS

J. Carroll, I. Geld, and G. Norwitz*
Material Laboratory
New York Naval Shipyard
Brooklyn, N. Y.

RECENTLY THE AUTHORS DESCRIBED a colorimetric procedure for the determination of aluminum in steels[1] that has given excellent service in this laboratory. However, it was found that the method could not be applied to the determination of aluminum in titanium-bearing steels or high-temperature alloys containing titanium, since the titanium hydrolyzes out when the color is developed. This, of course, would be expected from the chemistry of titanium.

A first attempt to correct the interference of titanium in the colorimetric determination of aluminum in these steels was unsuccessful since the interference was quite erratic. The sodium carbonate fusion separation method of Parks and Lykken[3] was next considered, but was found impractical for the purpose. It was finally decided to use a cupferron separation to separate the titanium from the aluminum.[2] An attempt was then made to determine the aluminum directly on the cupferren filtrate, but this failed because of the high acidity and the interference of cupferron itself.

The problem was finally solved by evaporating the cupferron filtrate to a volume of about 2 ml before the development of the color. This treatment destroyed the cupferron, since perchloric acid was present in the solution, and removed the excess acid. The evaporation can be carried out in ordinary pyrex glassware. It was found that the blanks obtained with pyrex glassware were no greater than when platinum dishes were used.

Special Reagents

Benzoic Acid Solution (10 per cent): Dissolve 50 grams of benzoic acid in 500 ml of methanol.

Buffer Solution: Mix 470 ml of ammonium hydroxide and 430 ml of glacial acetic acid. Cool to room temperature and add more acid or base as necessary to adjust the pH from 5.25 to 5.35 when diluted 1 to 20. Dilute to 1 liter.

Gelatin Solution (1 per cent): Dissolve 3 grams of U. S. P. gelatin by adding hot water and stirring. Cool and dilute to 300 ml.

Aluminon Reagent: Dissolve 0.3 grams of high purity aluminon in 200 ml of water and add 60 ml of benzoic acid solution (10 per cent). Dilute to 300 ml. Add 300 ml of buffer solution and 300 ml of gelatin solution and shake. The aluminon reagent should stand 3 days before use. This reagent is stable for at least 2 months if stored in the dark.

Procedure

For samples containing less than 0.15 per cent aluminum use a 1-gram sample; for sample containing more than 0.15 per cent aluminum use a 0.1-gram sample. Transfer the sample to a 250-ml Erlenmeyer flask and dissolve with a mixture of 8 ml of hydrochloric acid and 8 ml of nitric acid. Add 8 ml of perchloric acid and heat until the perchloric acid refluxes and the silica is dehydrated. Add 30 ml of water, filter through a medium texture filter paper and wash with 1 per cent sulphuric acid solution.

If total aluminum is required, ignite the filter paper and precipitate, treat with sulphuric and hydrofluoric acids, re-ignite, and fuse with 0.5 grams of sodium bisulphate. Dissolve the melt in water and combine with the main solution. Electrolyze with a mercury cathode until the iron is removed.

Add 10 ml of sulphuric acid, and cool to 10 C. Add cupferron solution (6 per cent) slowly from a burette until no further precipitation occurs. Add a little paper pulp, and filter through a medium texture filter paper. Wash with cold 2 per cent sulphuric acid solution and discard the filter paper. Add 25 ml of nitric acid to the filtrate and evaporate to fumes of perchloric acid to destroy the cupferron. Continue heating at strong heat until the volume is reduced to about 2 ml. Add about 50 ml of water and boil a few minutes to dissolve the salts. Cool, and dilute to 200 ml in a volumetric flask.

Pipette a 5-ml aliquot into a 100-ml volumetric flask. Thoroughly mix the aluminon reagent and add 15 ± 0.5 ml with a pipette. Do not allow the aliquot or the aluminon reagent to run down the neck of the flask. Heat for 20 min on the steam bath in such a way that the steam comes in contact with the sides of the flask.

Cool in a running-water bath for 5 min, dilute to 100 ml with water and shake. Within 2 hr compare the solution with a reagent blank at 540 millimicrons in a photoelectric colorimeter (4-cm cell). Convert the readings to percentage of aluminum by referring to a curve prepared from standard aluminum solution or standard samples.

The results obtained on two synthetic samples are shown in Table I.

* Present address, 3353 Ridge Ave., Philadelphia, Pa.

NOTE: The opinions expressed in this article are those of the authors, and are not to be construed as representing the official views of the Navy Department.

References

1. J. Carroll, I. Geld, and G. Norwitz, AMERICAN FOUNDRYMAN, April 1950, p. 105.
2. W. F. Hillebrand, and G. E. F. Lundell, *Applied Inorganic Analysis*, p. 110, John Wiley and Sons, New York, 1929.
3. T. D. Parks, and L. Lykken, *Analytical Chemistry*, 20, 1102 (1948).

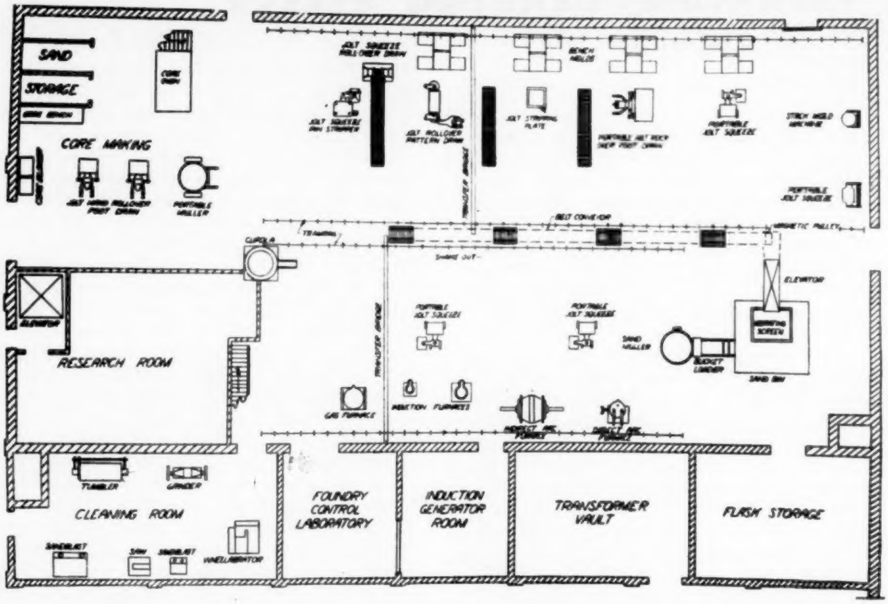
TABLE I—RESULTS FOR ALUMINUM IN SYNTHETIC SAMPLES

Sample	Aluminum Present, %	Aluminum Found, %
A[1]	0.33	0.33
		0.34
		0.34
B[2]	0.033	0.031
		0.033
		0.033

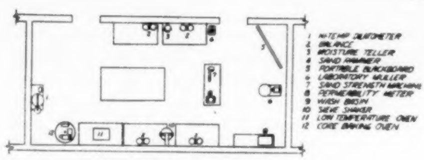
[1] Made from National Bureau of Standards sample 123a + 0.33% Al + 3.0% Ti.

[2] Made from National Bureau of Standards sample 123a + 0.33% Al + 2.3% Ti.

Plan Full Use of Purdue University Foundry Laboratory This Year



Layout of Purdue University's new foundry laboratory shows a design for teaching modern foundry practice to classes numbering up to 32 students. Building construction and installation of facilities are expected to be completed in 1951 and operation on a reduced scale is contemplated for the summer. Laboratory will cover 7300 sq ft.



SAND CONTROL LABORATORY

PURDUE UNIVERSITY's foundry laboratory, now under construction, is designed for instruction, for research, and for castings production. The system is sufficiently mechanized to enable students to devote maximum time and effort to constructive learning, according to C. T. Marek, associate professor of manufacturing processes. More time can be devoted to relationship between design and production economy, and elements of materials handling can be illustrated. The existing foundry with its new addition will cover 6,875 square feet with the adjacent sand control laboratory covering about 473 square feet. Pattern storage room and a lecture and demonstration room (not shown) complete instruction facilities. Mechanized foundry facilities include standard types of molding equipment, core blowers, tramrails, roll conveyors, and induction, direct, indirect arc electric furnaces, and a gas furnace, and cupola. Return sand will be handled by conveyor belt which passes under four floor-level shakeout grates to a magnetic pulley and elevator. Molding sand will be prepared in a bucket-loaded mixer from an overhead sand bin; core sand will be mixed in a portable mixer. Sand distribution will be by dump bucket suspended on the tramrail. Two 500-lb ladles will move over the same tramrail to distribute molten metal to the molding bays. Metals cast will be iron, steel, aluminum and copper-base alloys. Among castings to be made on a production basis are drill press bases for the Purdue machine shop. Cleaning room equipment includes a sand blast cabinet, a mechanized shot blast, tumbler, grinder, and saw. Advanced students will use the control laboratory for making chemical analyses, mechanical tests, metallographic studies, and foundry control tests such as fluidity spirals and chill tests.

Laboratory capacity will be 32 and classes will be kept as small as possible to avoid the faults of mass instruction and to give the students the maximum personal attention.

Foundrymen who last November witnessed the start of the expansion program will be able to see the enlarged foundry during this year's Metals Casting Conference, sponsored by the Central Indiana and the Michiana Chapters and Purdue, November 1 and 2.

PENN STATE COLLEGE

is installed as eleventh A.F.S. STUDENT CHAPTER

Michigan State College Celebrates Its First Anniversary

INSTALLATION of the eleventh A.F.S. student chapter took place May 23 in the art gallery of the Penn State College School of Mineral Industries where Donald L. Freyberger, chairman of the student group, accepted the cast iron rattle from Herbert F. Scobie, editor, AMERICAN FOUNDRYMAN. Culminating some six months of planning by Wesley P. Winter, foundry instructor, R. W. Lindsay, professor of metallurgy, the late C. W. Morisette of the industrial engineering department, and a group of foundry and metallurgy students, the chapter was installed shortly after approval by the national officers and directors of the Society.

Officers of the Penn State Student Chapter for the coming year are: *chairman,* Walter J. Yahn; *vice-chairman,* George Davis; *secretary,* Ronald Altobelli; and *treasurer,* Richardson B. Farley. Mr. Winter is faculty adviser. Industrial adviser is T. C. Jester, Darling Valve & Mfg. Co., Williamsport, Pa.

Participating in the installation, in addition to the officers and advisers, were: C. E. Bullinger, head of industrial engineering; J. W. Fredrickson, chief, division of metallurgy; and Professor Lindsay.

Penn State students who signed the petition for recognition as an A.F.S. student chapter are: Richard Adams, Ronald Altobelli, Levis Baldwin, J. Rodney Blauser, George Davis, Richardson B. Farley, Theodore M. Frazell, Donald L. Freyberger, Loren Green, Louis C. Haeffner, Herbert W. Hoover, George Horne, Richard L. Klosterman, Robert W. Maulburg, Francis L. Turk, Walter J. Yahn, James H. Black, Donald G. Hazlett, Joseph M. Snook, Peter P. Krowsoski, and Howard C. Karr.

Purpose of the Michigan State Student Chapter's second annual Student-Industry Banquet, according to Secretary Gene R. Rundell, was to let foundrymen and their future employees become acquainted. Chapter Chairman Fred W. Schwier presided and introduced a number of representatives of the Detroit, the Western Michigan, the Central Michigan, and the Saginaw Valley Chapters of the Society.

Ashely B. Sinnett, incoming vice-chairman of the Michigan State College Student Chapter mounting patterns on matchplate for souvenir castings distributed at the chapter's first anniversary dinner May 16. Part of the head table at the dinner shows, left to right: George K. Dreher, Foundry Educational Foundation, Cleveland; Collins L. Carter, Albion Malleable Iron Co., Albion, Mich., industrial adviser to the chapter; Fred W. Schwier, chapter chairman; Prof. James Hayes, principal speaker; Herbert F. Scobie, editor, AMERICAN FOUNDRYMAN; *Prof. C. C. Sigerfoos, chapter faculty adviser; Donald I. Huizenga, chapter vice-chairman; and Ross P. Shaffer, Lakey Foundry & Machine Co., Muskegon. Photographs courtesy R. Burl Romick.*

? ? WHO'S WHO ?

L. N. Schuman

Leslie N. Schuman, author of *"Modern Foundry Methods—Straighten Malleable Iron Castings,"* Page 48, is plant superintendent for National Malleable & Steel Castings Co., Cleveland . . . Starting his apprenticeship as a tool maker at American Steel & Wire Co., Cleveland, from 1918 to 1922, Mr. Schuman worked in various Cleveland jobbing foundries until 1926, when he became pattern layout man for National Malleable & Steel Castings. . . Since that time he has been successively, inspector, finishing department foreman, assistant foundry superintendent, foundry superintendent and, since 1945, plant superintendent. . . He is an immediate past director of the A.F.S. Northeastern Ohio Chapter . . . His article in this issue is a pictorial condensation of his paper, *"Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings,"* presented at the 1951 A.F.S. Convention in Buffalo.

E. C. Zirzow

E. C. Zirzow, author of *"Factors Governing Sea Coal Selection and Control,"* Page 45, has for several years been active in both technical and chapter activities of A.F.S. . . . He has spoken before many chapters of the Society on foundry sand topics and has been a frequent contributor to the foundry technical press . . . A graduate of Cleveland College in his home town, Mr. Zirzow joined National Malleable & Steel Castings Co., Cleveland, in 1924, and was chairman of the A.F.S. Northeastern Ohio Chapter in 1948, when he resigned to become sand technologist with Deere & Co., Moline, Ill., his present position. Chairman of the first Ohio Regional A.F.S. Foundry Conference, he is today chairman of the A.F.S. Core Test Committee and a member of the Sand Division's Executive Committee and several other committees of the Division. . . His extracurricular activities include chairmanship of the Board of Christian Education, superintending Sunday school, and past mastership of a Masonic Lodge.

T. M. Dyer

Thomas M. Dyer, co-author with F. L. Cuthbert of *"Bentonite Bonding Properties Affected by Drying Temperature and Moisture Content,"* Page 50, is chemist for Baroid Sales Div., National Lead Co., Los Angeles . . . A graduate of Long Beach City College, Long Beach, Calif., his first employment was with Los Angeles Gas & Electric Corp. as soil survey clerk. . . He then joined Axelson Mfg. Co., as assistant to metallurgist, and was employed successively by Lockheed Aircraft Co., Ford Motor Co., and Aviation Maintenance Co. in various technical capacities prior to joining Baroid in 1948.

F. L. Cuthbert

F. L. Cuthbert, co-author with Thomas M. Dyer of *"Bentonite Bonding Properties Affected by Drying Temperature and Moisture Content,"* Page 50, is director of sales and service laboratories for Baroid Sales Div., National Lead Co., Houston, Texas. . . Holder of a B. A. from the University of Buffalo, and an M. A. and Ph. D. from Iowa State College, he became a research associate at the University of Illinois from 1940 to 1944 and served in a like capacity for Princeton University during the same period. . . In 1945 he assumed his present position as director of sales and service laboratories for Baroid. . . He is a frequent contributor to the geological technical press.

J. W. Birks

John W. Birks, author of *"Problem in Gray Iron Molding,"* Page 34, is a native of England who immigrated to Canada in 1947, where he is on the foundry staff of Crane Limited, Montreal . . . Born in Chesterfield, England, in 1903, Mr. Birks is a veteran of 33 years in the foundry industry, beginning with his apprenticeship at the Sheepbridge Coal & Iron Co., Ltd., Chesterfield. . . After serving with several well-known British foundries, Mr. Birks attended Nottingham University and later taught foundry practice to students at Ilkeston Secondary School. . . Prior to immigrating to Canada in 1947, Mr. Birks was foundry manager Wagon Repairs, Ltd.

C. L. Carter

Collins L. Carter, author of *"Absorbing the Technical Trainee,"* Page 52, is trustee representing the Malleable Founders' Society in the Foundry Educational Foundation . . . He is past president of the Malleable Founders' Society and the National Castings Council and is a past director of the A.F.S. Central Michigan Chapter. . . A graduate of Culver Military Academy and Cornell University, Mr. Carter began as a supervisor with Albion Malleable Iron Co., Albion, Mich., in 1929, becoming a salesman in 1933, sales manager in 1936, and in 1938 president and general manager of the company. He served as a major of infantry from 1941 to 1944 and is an Honorary Reserve.

Northern California Chapter Publishes Roster

PUBLISHED RECENTLY is a 44-page Fifteenth Anniversary Industrial Directory and Roster of Members of the A. F. S. Northern California Chapter.

Comprising 44 pages, the booklet contains a complete roster of Chapter members, together with their company affiliations, a list of Northern California foundries and pattern shops, by-laws of the Chapter and a statement of policy.

Install Cope And Drag Officers

COPE AND DRAG CLUB officers for the coming year took office at the annual meeting of the group April 24 during the 55th Annual A. F. S. Convention in Buffalo, N. Y. President is Eugene Conreaux, Illinois Cereal Mills Inc., Granite City, Ill.; vice-president is Jos. S. Schumacher, Hill & Griffith Co., Cincinnati. Secretary-treasurer of the club is Eugene W. Smith, Western Materials Co., Chicago. Next quarterly technical meeting of the group, scheduled for August 2-3 will be devoted to induction baking of cores and sand and core testing practices.

New AFS MEMBERS

NEW COMPANY MEMBERS

Crucible Steel Co. of America, Harrison, N. J., Charles D. Preusch, Fdy. Met. (Metropolitan Chapter).

Diamond Alkali Co., Cleveland, Milton L. Huemme, Coke Sales Mgr. (Northeastern Ohio Chapter).

Graning Enameling Co., El Monte, Calif, Thomas Graning, Partner (Southern California Chapter).

Krause Plow Corp., Inc., Hutchison, Kansas, F. Wallace Johnson, Gen. Mgr. (Tri-State Chapter).

Oregon Steel Fdy. Co., Portland, Ore., K. K. Manchester, Prod. Mgr. (Oregon Chapter).

Whitewater Manufacturing Co., Whitewater, Wis., Robert J. Stevenson, Pres. (Wisconsin Chapter).

BIRMINGHAM DISTRICT CHAPTER

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Gordon R. Moffat, Plant Supt., Draper Corp., E. Spartanburg, S. C.
Ralph Nelson, Thomas Foundries, Inc., Birmingham.
Horace C. Willis, Field Engr., United States Pipe & Fdy. Co., Birmingham.

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Wilson W. Evans, Prod. Control Mgr., Hyster Co., Peoria, Ill.
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Raymond G. Thorpe, Research Investigator, Cornell University, Ithaca, N. Y.

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Harry J. Leddy, Castings Fmn., Griffin Wheel Co., Chicago.
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OHIO STATE UNIVERSITY

John Arthur Koch

PENNSYLVANIA STATE COLLEGE

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Joseph M. Snook	Francis L. Turk	Walter J. Yahn

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INTERNATIONAL

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Norman Charles Fisher, Managing Dir., Universal Pattern Co., Bermondsey, London, England.

Finland

Veijo F. Kaskela, Engr., Foundry, Walmef O. Y., Syvaskyld, Finland.

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A. Barbeyrac, Longwy Steel Cy., Mont St. Martin, France.
Rene Bouguet, Dir. of Works Lab., S. A. Peugot, Sochaux, Doubs, France.
Charles Laffite, Tech. Mgr., Soc. Indus. de Transmissions Columbes-Texrope, Levallois, Perret (Seine) France.

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ELECTROMET *Data Sheet*

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How Manganese Briquets Control Sulphur ... Produce Cleaner, Sounder Iron Castings

The use of manganese briquets in the cupola charge provides a convenient and accurate method of controlling this important element in cast iron. Accurate control of the manganese level is essential for the consistent production of high-quality iron. While manganese will be introduced in varying amounts by the pig iron and scrap, a supplementary source—such as manganese briquets—is usually essential if accurate analysis control is to be maintained.

Manganese has two important functions in cast iron:

1. It acts as a sulphur-neutralizing element when used in small amounts – up to roughly six times the sulphur content.
2. It acts as an alloying element, imparting density and strength when present in amounts greater than necessary to perform its desulphurizing function.

Neutralizes Sulphur

Cast iron tends to run considerably higher in sulphur than was the case a decade ago because there has been an increase in the sulphur content of both scrap and foundry coke in recent years. Unless sufficient manganese is provided in the cupola mixture, this higher sulphur content will tend to produce a hard, brittle metal with deep chilling properties and poor fluidity. Castings of such metal are difficult to machine and may be the cause of many foundry troubles, including strain cracking, chilled corners and edges, and misrun castings.

Since manganese has a high affinity for sulphur, it forms manganese-sulphide inclusions when present in sufficient amounts. These inclusions are relatively harmless to the metal, and the detrimental effects of the sulphur content are thus largely eliminated. It is good practice to maintain a manganese-sulphur ratio of approximately 6:1 to insure proper neutralization of the sulphur content.

A certain proportion of the manganese-sulphide that is formed will float to the surface of the molten iron and be absorbed by the cupola slag. In this way, manganese actually eliminates a portion of the sulphur introduced by cupola melting. Thus, relatively high manganese irons will invariably run lower in sulphur than will metal melted from similar raw materials but of lower manganese content.

Sounder Castings

The cleansing effect of manganese is a decided help in producing a high-quality foundry product with a minimum amount of trouble from porosity, shrinks, and blows. Manganese helps to neutralize gassy metal that may result from temporarily unbalanced cupola conditions or poor-quality melting materials. It improves the fluidity of iron that may be a little on the cold side or high in sulphur. Manganese does a general cleansing job that is helpful in avoiding slag inclusions, which have a detrimental effect on machinability.

Alloy Effects

When manganese is used in amounts greater than that necessary to neutralize sulphur, it acts as a desirable carbide-stabilizing alloy in cast iron. Depending on the amount added and other elements present, manganese tends to refine pearlite and, at higher levels, to form martensite. Increasing the normal percentage of manganese in cast iron to 1 per cent or above will often change a normally ferritic-pearlite matrix to the stronger all-pearlitic structure.

Two Types of Briquets

Electromet produces two types of manganese briquets – EM silicomanganese briquets and EM ferromanganese briquets. The silicomanganese type is square in shape and contains exactly 2 lb. of manganese and about ½ lb. of silicon. Ferromanganese briquets, which are oblong in shape, also contain exactly 2 lb. of manganese, but do not contain silicon.

The recovery of manganese from EM manganese briquets normally runs about 85 per cent, because the briquets are made with a binder that prevents oxidation until the alloy unites with the iron in the melting zone of the cupola.

A typical mixture for high-strength iron is given in the accompanying table. For further information—

Typical Cupola Charge for Producing High-Strength Iron With EM Briquets

Base Charge %	Base Charge Lb.	Material Charged	Silicon %	Silicon Lb.	Manganese %	Manganese Lb.
15.0	150	Pig Iron	2.30	3.45	0.70	1.05
40.0	400	Steel Scrap	0.10	0.40	0.45	1.80
35.0	350	Return Scrap	1.90	6.65	1.00	3.50
10.0	100	Purchase Scrap	2.00	2.00	0.45	0.45
100.0%	1,000 lb.	Total Base Charge		12.50		6.80
Briquets Required		7½ Small Silicon		7.50		—
		2½ Silicomanganese		1.25		5.00
		Total Alloys Charged		21.25 lb. Si. or 2.12% Si.		11.80 lb. Mn. or 1.18% Mn.
		Melting Recovery Factor		x .90		x .85
		Final Analysis of Iron		1.90% Si.		1.00% Mn.

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Technical Service Department
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Please send me a copy of the booklet "Briquetted Alloys for the Iron Foundry Industry".

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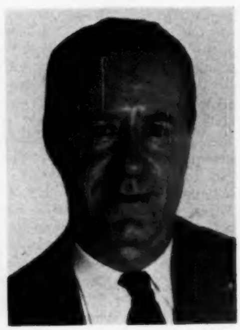

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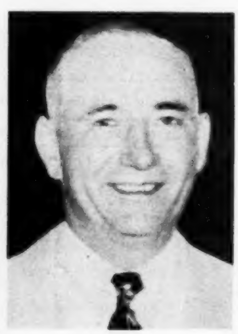

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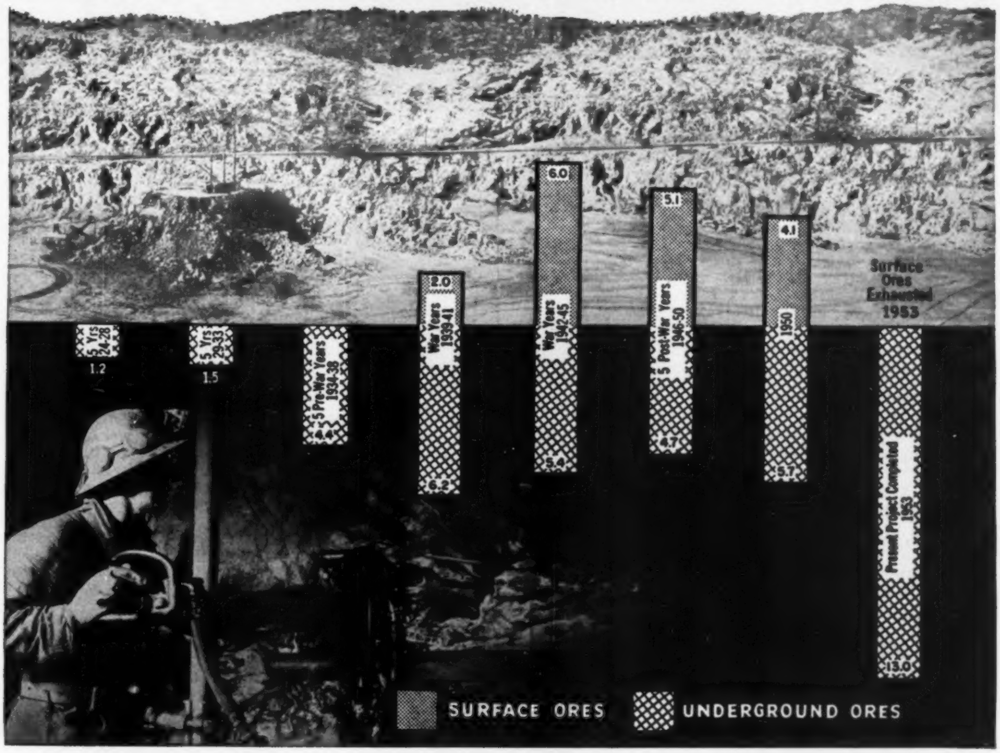
Underground and surface ORE MINED (yearly average—millions of tons)



Underground for Defense

...started more than 10 years ago

STRENGTH...military and economic ... depends on productivity. And productivity depends on men who have devoted long years to their specialized chosen field of endeavour.

Such men with "know-how" mine nickel from the rocky rim of Ontario's Sudbury Basin...

By increasing output with maximum speed and drawing on reserve stocks of nickel previously accumulated, they helped raise deliveries of nickel in all forms during 1950 to 256,000,000 pounds... a record for any peace-time year.

This record, 22% greater than the 209,292,257 pounds delivered in 1949, was no accident...

In 1937, INCO launched a vast long-range project which now makes it possible to meet the military requirements of the United States, Canada and the United Kingdom. In addition, nickel deliveries are being made to government stockpiles and the balance of the supply is being rationed among civilian consumers in all markets throughout the free world.

Since the inception of International Nickel, its fixed policy has always been to increase the supply of nickel. To meet today's needs, INCO went underground years ago.

Anticipating the eventual depletion of Frood-Stobie open pit surface ores, more than 10 years ago, INCO embarked on a program of replacing open pit with underground capacity. This required extensive enlargement of underground plants, development of new methods of mining not previously undertaken and the revamping of metallurgical processes to cope with difficulties in recovering nickel from the new types and lower grades of ores which have to be reached.

Major expansion in output of nickel from underground operations is being driven to conclusion with utmost speed. There is still much construction to be done and a number of mining and metallurgical problems remain to be solved and tested in actual operation. Barring unforeseen interruptions, full conversion to underground mining should be completed in 1953.

When the present undertaking is completed, INCO will be able to hoist 13,000,000 tons annually, and the size of its underground mining operation will surpass that of any other nonferrous base metal mining operation in the world.

This underground expansion is being completed by INCO without interrupting current production of nickel, which is at maximum capacity.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

FOUNDRY *Personalities*

H. C. Stone has been appointed to the recently created post of assistant works manager of Belle City Malleable Iron Co., Racine, Wis. Replacing him as chief metallurgist is **Edward N. Wheeler.** Advanced to assistant foremen are **Carmen Deluca, Albert Tobias, Eugene Mikulesky, Robert Mueller, George Boldus, Edward Blaha, Frank Obal, Jerome Wiegal, and Frank J. Abrahamson.**

Arnold Lenz, A.F.S. Past National Director and Whiting Gold Medalist, has been appointed general manager, Pontiac Motor Division, and vice-president of General Motors Corp., Pontiac, Mich. Mr. Lenz was formerly executive assistant to Pontiac's general manager.

Stanley F. Krzeszewski, factory manager at American Wheelabrator & Equipment Corp., Mishawaka, Ind., and chairman of the A.F.S. Michiana Chapter, was recently

S. F. Krzeszewski

elected a vice-president of the company. He has been with Wheelabrator since 1945 and is past president of the Rotary Club in nearby South Bend, Ind.

John Nickel, foundry superintendent for the Hamilton Foundry & Machine Co., Hamilton, Ohio, is retiring this summer after spending 51 years in the gray iron foundry industry. The 70-year-old foundryman began his association with the castings industry at the age of 19 as an apprentice molder. Completing his apprenticeship, he joined Hamilton in 1904 as a journeyman bench molder and grew up with the company, which was then some 13 years old. Mr. Nickel, who has been foundry superintendent since 1918, will divide his time between his Hamilton home and his farm at Union City, Mich. Succeeding Mr. Nickel as foundry superintendent is **Harold Roesch,** his longtime assistant and associate. Mr. Roesch joined Hamilton in 1906 and was made foundry foreman at the time Mr. Nickel was made foundry superintendent. He has been as-

Harold Roesch

R. R. Deas

John Nickel

sistant foundry superintendent since 1925. Also announced by Hamilton is the appointment of **Richard R. Deas,** formerly research director of the Hamilton Research and Engineering Corp., Anniston, Ala., as assistant to the vice-president in charge of production. A graduate of the University of Alabama, Mr. Deas is a director and past chairman of the A.F.S. Birmingham District Chapter.

Ralph E. Rausch, formerly chief engineer at Link-Belt Co.'s Pershing Road Plant, has been appointed consulting engineer to the company and will continue to make his headquarters at the Pershing Road Plant. Succeeding him as chief engineer is **Joseph J. Richard,** formerly executive assistant chief engineer.

Harry E. Lewis has been named to the newly created position of general sales manager of the Industrial Sales Department, Perlite Division, Great Lakes Carbon Corp., and will be responsible for planning and directing all industrial per-

H. E. Lewis

lite sales operations of the company. A graduate of Purdue University, Mr. Lewis was formerly manager of the company's Building Products Division's Product Development Dept. He will headquarter in the Great Lakes Carbon Corp. Bldg., New York City.

Robert W. Suman, formerly chief engineer for Link-Belt Co.'s power transmission products, has been appointed chief engineer of Link-Belt's Philadelphia Plant, succeeding **William S. Campbell,** chief materials handling and applied engineering products engineer, who is retiring from active service.

H. J. Krause, formerly with Newaygo Engineering Co., Newaygo, Mich., has been appointed Eastern sales representative for Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, succeeding **Harold Lind,** who becomes Midwest territory sales

representative. Mr. Krause was for several years a member of Beardsley & Piper's engineering staff prior to joining Newaygo. Mr. Lind, who succeeds the late **R. L. Hannan** as Midwest sales representative, has been with the company since 1923.

Winfield S. Axford, formerly comptroller and assistant to the president, has been named executive vice-president of A. S. Campbell Co., Boston, and its subsidiaries, Cello Products Co. and Hunt-Spiller Manufacturing Corp.

Patrick Dolan, for many years a sales engineer for Patterson Foundry & Machine Co., East Liverpool, Ohio, has been appointed district manager of the company's newly established Baltimore office, located at 1605 Court Square Bldg.

Fred H. Haggerson, president of Union Carbide & Carbon Corp., New York, since 1944 and an employee of the company for more than 30 years, has been elected chairman of the Board of Directors.

P. R. Utz has been promoted to assistant general superintendent in charge of the Malleable Division, Chicago Works, National Malleable & Steel Castings Co., according to Stowell C. Wasson, manager of the company's Chicago and Melrose Park, Ill., plants. Mr. Utz, who graduated from

P. R. Utz

Rose Polytechnic Institute in 1932, joined National Malleable that year and has been, successively, core room manager, assistant foundry superintendent and foundry superintendent at the company's Indianapolis Works.

Nathan Levinsohn has been named foundry superintendent of the Lake Street Plant of Minneapolis-Moline Power Implement Co., Minneapolis. The foundry produces 200 or more tons of gray iron tractor castings each day.

Alan Cameron, for 25 years sales representative for aircraft supply and technical firms, has been named sales manager of the newly created foundry division of Rosan, Inc., South Gate, Calif. Mr. Cameron, who was named chairman of the National Aircraft Distributors Merchandising

(Continued on Page 86)

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Beaming smiles were the order of the evening at the Past Chairmen's Table during Central Indiana Chapter's May 7 meeting, honoring its occupants. From left: Richard Bancroft, Perfect Circle Co.; B. P. Mulcahy, Fuel Research Laboratories; R. S. Davis, National Malleable & Steel Castings Co.; Robert Langsenkamp, Langsenkamp-Wheeler Brass Works; and Franklin S. Swain, Golden Foundry Company, Columbus, Ind.

CHAPTER ACTIVITIES NEWS

Chesapeake

A. A. Hochrein
Federated Metals Div., American Smelting & Refining Co.
Chapter Chairman

REGULAR BUSINESS MEETING of the Chesapeake Chapter was held March 30 at the Engineers Club, Baltimore, and featured a film and technical talk.

William Johnson, Naval Research Laboratory, Washington, D. C., presented the film, *"Finger Gating,"* in sound and color.

Following the film, C. L. Lane, Florence Pipe Foundry & Machine Co., Florence, N. J., gave an interesting and educational talk on *"Why Make Bad Iron?"* in which he contended that all iron is good if used in its proper allocation. Mr. Lane's remarks led to a lively discussion.

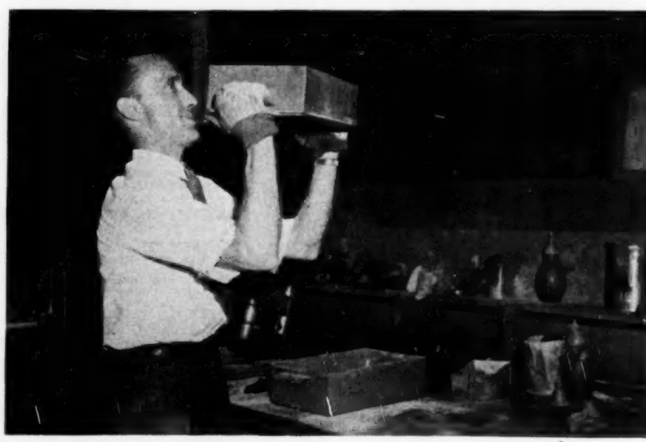
Chicago

Dean Van Order
Burnside Steel Foundry
Chapter Reporter

APRIL MEETING of the Chapter, held at the Chicago Bar Association, featured as its main speaker Kenneth W. Haagensen, Allis-Chalmers Mfg. Co., Milwaukee, whose topic, *"What Kind of a Salesman Are You?"*, was well received by his audience.

Using as an example his own organization, Mr. Haagensen said management must continually sell its policies to employees. Allis-Chalmers, Mr. Haagensen said, employs a competent staff to do this, just as its sales department hires a staff to sell the company's products, and the expense has been well justified in improved relations between management and labor.

Carrying this through farther, Mr. Haagensen said every person in industry must be a salesman for his company, and not only for his company but for his country and its way of life. In business, he said, a company that is consistently outsold by its competition is doomed to failure. The same applies to the United States, Mr. Haagensen continued, whose people



John Shinn, Catalin Corp., Chicago, a 1948 OSU Foundry Option graduate, returned to his alma mater's foundry laboratory May 1 to demonstrate the shell mold process to Ohio State University Chapter.

must adopt a less negative and more constructive attitude in selling their way of life to the rest of the world. If we don't, he said, our nation's enemies will succeed in selling their policies where we fail.

Mr. Haagensen closed his talk by re-emphasizing the tremendous job facing individuals and organizations in selling the great benefits of the American way of life, rather than trying to defend its few faults.

Chapter Chairman C. V. Nass, Pettibone Mulliken Corp., Chicago, announced that a new chapter directory, the first in several years, will be ready sometime this fall.

Central Illinois

Robert Paluska
Caterpillar Tractor Co.
Chapter Reporter

Largest meeting of the year, held April 2 at the American Legion Post No. 2, Peoria, was attended by 125 members and their guests.

Featured event of the evening was a showing of the A.F.S. film, *"Fluid Flow in Transparent Molds–II,"* produced at Battelle Memorial Institute, Columbus, Ohio, under the sponsorship of the A.F.S. Aluminum & Magnesium Division Research Committee. A lively discussion period followed showing of the film.

Twin City

J. D. Johnson
Foundry Products Div., Archer-Daniels-Midland Co.
Chapter Reporter

Last meeting of the season was held May 8, with some 70 foundrymen and guests attending.

Secretary-Treasurer Lillian K. Polzin reported the Chapter's finances are in good shape for the fiscal year despite a large contribution to the Society's Building Fund.

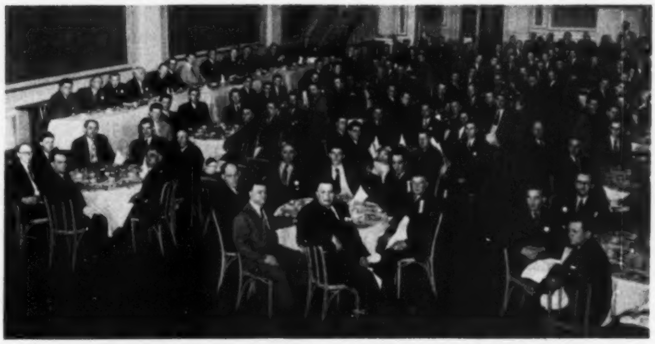
K. W. Haagensen, Allis-Chalmers Mfg. Co., Milwaukee, gave an excellent talk, *"What Kind of a Salesman Are You?,"* in which he urged selling the American way of life to preserve the "best system of government ever devised" against forces dedicated to degradation and ultimate destruction of the United States.

Chesapeake

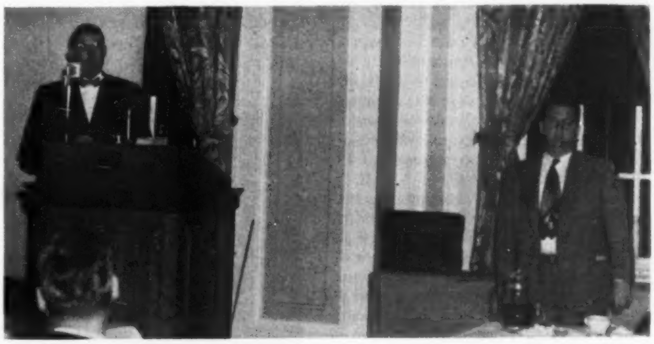
William H. Baer
Naval Research Laboratory
Technical Chairman

Regular monthly meeting had a good attendance, considering that it was held April 27, immediately following the A.F.S. Foundry Congress in Buffalo.

Principal meeting speakers were R. A. Colton, Federated Metals Div., American Smelting & Refining Co., and Dr. Carl Zapffe, Baltimore consulting metallurgist. Mr. Colton and Dr.



Ontario Chapter's March 30 dinner meeting at the Royal Connaught Hotel, Hamilton, attracted this fine crowd of chapter members and guests.



Douglas James, Cooper Bessemer Corp., Grove City, Pa., left, speaking at Philadelphia Chapter's April 13 meeting on "Nodular Iron" as Program Chairman William A. Morley, Link-Belt Co., Philadelphia looks on.

This group of Michigan State College Student Chapter members, faculty and industrial sponsors were recent guests of Engineering Castings Co., Marshall, Mich. (Photograph courtesy of Marshall Evening Chronicle.)

Zapffe discussed *"Reducing vs. Oxidizing Atmospheres for Bronze Melting."*

Mr. Zapffe started the meeting with a discussion on the method of occurrence of gases in metals in general. Mr. Zapffe also showed a number of slides that brought out clearly the advantages of degassing by using various atmospheres for different types of metals.

Mr. Colton discussed the chemistry of gases in metals as pertaining to bronze castings. He stated that gas in metals is something that we have to live with and the best cure is to take all possible precautions before melting, to prevent as much gas as possible from entering the metal.

Mr. Colton said he would recommend melting under oxidizing conditions because when the oxygen is high the hydrogen is low. As hydrogen is the recognized gas former, it is better to keep it on the low side.

The speaker cited an English paper published some years ago in which the author recommended a certain amount of gas in molten metal to disperse shrinkage. Mr. Colton stated it would be very difficult to determine the exact amount of gas to prevent concentration of the shrinkage.

During the entire discussion, the interest was so intense one could hear the slightest sound. Numerous questions were presented from the audience, which did not show disagreement with the speakers, but rather, a desire to obtain all possible knowledge about gases in metals.

Honored as representatives of A.F.S. Sustaining Member companies at Detroit Chapter's April 19 meeting were, left to right: Claude B. Schneible, Claude B. Schneible Co., Detroit, and A.F.S. Past National Director Frank C. Riecks of Ford Motor Co., Dearborn, Mich., shown with Chapter Chairman Jess Toth, Harry W. Dietert Co., and Chapter Vice-Chairman Vaughan C. Reid, City Pattern Foundry & Machine Company, Detroit.

Snapped by chapter photographer Kenneth F. Sheckler, Calmo Engineering Co., during Southern California Chapter's April meeting were, left to right: Chapter President John Wilson, Climax Molybdenum Co.; Speaker E. B. Sumner and Glenn V. Ballard, both of Federated Metals Div.

Washington

Harold R. Wolfer
Puget Sound Naval Shipyard
Chapter Reporter

MARCH MEETING, held at the Gowman Hotel, Seattle, opened with a coffee talk by Prof. William Snyder, who discussed use of olivine sands at the University of Washington. The University, he said, has cast aluminum, bronze and gray iron in crushed and graded olivine sand and it was found that very fine grades of olivine could be used to promote casting finish without sacrificing mold permeability. The grain shape, he said, was angular and hard ramming was found necessary to overcome penetration.

The 158 foundry industry veterans pictured here at Northeastern Ohio Chapter's Old Timers' Night, April 12, have a cumulative total of more than seven thousand years spent in the foundry industry. (Photograph courtesy of Sterling N. Farmer, Sand Products Corp., Cleveland, Ohio).

Professor Snyder reported good molding qualities when olivine was bonded with 1 per cent western bentonite and 1 per cent dextrine. Olivine, he concluded, has a high fusion point, and its expansion is low and uniform.

Speaker of the evening Joseph Gitzen, Delta Oil Products Co., Milwaukee, in discussing *"What Causes Core Failures?"* pointed out that four primary factors control core properties—sand, liquid and dry binders, water and bak-

First prize winners in Metropolitan Chapter's local apprentice contest, honored at the chapter's May 7 meeting were, left to right: Stephen Matviyetz, wood patternmaking, and Salvatore Alfiere, steel molding, both of Cooper Alloy Foundry Co.; and Joseph Ramaglia, Altas Foundry, gray iron molding. (Photo: John Bing, Metropolitan Refractories Corp.)

Principals in the Non-Ferrous Round Table group meeting at Wisconsin Chapter's May meeting were, left to right: Session Chairman Marvin E. Nevins, Wisconsin Centrifugal Foundry, and Speaker Donald LaVelle, American Smelting & Refining Co., Barber, N. J. (Photograph courtesy of Walter V. Napp, Badger Firebrick and Supply Company, Milwaukee.)

ing. Washed clay-free sands, he pointed out, require less liquid binder but require addition of binders that give good green strength. These mixtures give low hot strength and good collapsibility. On the other hand, sands containing clay and silt fines require more liquid binder or core oil and less green strength binders. These mixtures have high hot strength and poor collapsibility, he said.

Discussing merits and drawbacks of liquid and dry binders, Mr. Gitzen said core oil and linseed oil are two of the most used and abused core constituents and, along with water, cause the most core failures.

Water is most abused, he said—too much causes scabbing, sticking and penetration and high moisture makes for high core skin hardness. The speaker urged foundrymen to bake cores in the oven and not in the mold, because core failures are most often attributable to underbaked cores or undried core washes.

Northeastern Ohio

Robert F. Herrman
Penton Publishing Co.
Chapter Reporter

Old timers and apprentices were honored April 12 at the Tudor Arms Hotel, Cleveland. Approximately 150 foundrymen with 40 or more years of service to the industry received certificates acclaiming their work record. Total attendance was 337.

Apprentice winners in the local contest were announced and received prizes of $25, $15, and $10 for first, second, and third place in each division. Molding division winner was Donald Hinman, Hill Acme Co. Michael E. Sedlak, Hill Acme Co., was second, and Donald Marinelli, Fulton Foundry & Machine Co., was third.

In wood patternmaking, first prize went to Fred Fiorentini, Modern Pattern Co., second to Donald A. Siebert, Royal Pattern Works, and third to Eugene Chmielowicz, Motor Patterns Co. James Gaino, Royal Pattern Works, was the only entrant in metal patternmaking and his work was deemed worthy of first prize in that division.

Birmingham District

J. P. McClendon
Stockham Valves & Fittings, Inc.
Publicity Chairman

Some 100 foundrymen and guests enjoyed a social hour and dinner preceding an excellent talk by Frank S. Kleemans, Pittsburgh consulting engineer, who spoke on *"Improvement of Machinability and Other Properties of Iron Castings Through Controlled Deoxidation."* Mr. Kleeman's talk proved

Caught in an informal post-meeting talkfest at Central Michigan Chapter's March 12 meeting were, left to right; Prof. C. C. Sigerfoos, Michigan State College; Chapter Chairman Jack Secor, Hill & Griffith Co.; Speaker of the evening O. J. Myers, Archer-Daniels-Midland Co., Foundry Products Div., Minneapolis; and John Zeindler, Albion Malleable Iron Co.

to be very interesting and informative and evoked a great deal of discussion.

Chapter Chairman Morris Hawkins congratulated members of the McWane Cast Iron Pipe Co. and U. S. Pipe and Foundry Co. on their fine representation at the dinner meeting.

Eastern New York

George E. Danner
American Locomotive Co.
Publicity Chairman

APRIL MEETING was held jointly with the Eastern New York Chapter of the American Society for Metals. Speaker of the evening was Charles Moriarty of General Electric Co., who gave an excellent talk on *"Non-Destructive Testing of Materials,"* in which he outlined latest developments in use of the x-ray in industry, and in ultrasonic and magnetic particle testing.

Concluding the meeting, the nominating committee presented a slate of chapter officers and directors for the coming year.

Cincinnati District

Marvin L. Steinbuch
The Lunkenheimer Co.
Publicity Chairman

LARGE MEMBER AUDIENCE at the April dinner meeting enjoyed a steak dinner and an entertaining and enlightening talk on *"Gating and Risering Gray Iron"* by Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis.

Mr. Kessler presented simple empirical formulas for gating and risering of gray iron and repeatedly stressed clean, hot iron as a prime requisite in producing good castings.

Mr. Kessler's approach to the gating and risering of several specific castings was based on four possibilities: (1) change composition, (2) change risering, (3) chill, and (4) change casting design. He concluded by answering many questions on risering problems encountered by members of the audience.

Pre-meeting refreshment hour at Western Michigan Chapter's March 5 meeting, Cottage Inn, Muskegon, was enjoyed by, from left facing camera: Paul Johnson, Grand Haven Brass Foundry; National Director J. O. Ostergren, Lakey Foundry & Machine Co.; President-Elect Walter L. Seelbach Superior Foundry, Inc.; Cleveland, Ohio; Robert DeVore, Lakey Foundry & Machine Co.; and Chapter Chairman Stanley H. Davis.

Manning the A.F.S. Northern California Chapter booth at the recent Western Metal Congress in Oakland, Calif., were left to right: George Russell, Phoenix Iron Works; Robert Johnson, General Metals Corp.; Sam Russell, Phoenix Iron Works; Chapter Secretary Davis Taylor, American Wheelabrator & Equipment Co.; David Reeder, Electro Metallurgical Co., Division Union Carbide & Carbon Corp.; and President John Russo, Russo Foundry Equipment Co. (Photograph by "Pen" Roche)

Central Illinois

Robert J. Paluska
Caterpillar Tractor Co.
Chapter Reporter

LAST TECHNICAL MEETING of the season, held May 7 at the American Legion Home, Peoria, featured as guest speaker Warner B. Bishop, Foundry Products Division, Archer-Daniels-Midland Co.

Speaking on *"Core Room Problems,"* Mr. Bishop said that although foundrymen have attempted to use a variety of materials for binding core sand, cereal, core oil, synthetic resins and water comprise 99 per cent of the materials now in use.

Mr. Bishop enumerated the advantages and disadvantages of each of these materials and stated that proper ratios and mixing, along with control of baking time and temperature are important in the economical production of quality cores.

The meeting closed with election of 1951-52 officers.

Michigan State College

Kenneth E. Spray
Chapter Reporter

ON MARCH 10 members of the student chapter were guests of Engineering Castings Co., Marshall, Mich., where they spent two hours in the morning inspecting the plant's modern equipment and watching production of alloyed cast iron and steel valve inserts.

Of interest was the compact sand

Power-Rollover . . .
Automatic Draw

It's All Automatic!

SUTTER Automatic Core Draw Machine

From the time the core dryer is placed on the core box until the drawn core is resting on the draw table, the Sutter Automatic Core Draw Machine provides completely automatic cycle. All the operator does is place the dryer in position and push the start button . . . the dryer is clamped, the core box rolls over, the draw table rises to the core box and lowers to rest position without any attention from the operator. Meanwhile he is free to blow another core . . . free of the fatigue that normally accompanies rollover and draw operations. Output is upped from 300% to 400%.

There are other benefits, too. Since every core is drawn uniformly, even unskilled labor can maintain top output on the most complicated cores with minimum rejections. Placed next to a core blower (on either the right or left side) one operator performs both blow and draw operations.

Sutter Automatic Core Draw Machines with Power-Rollover are built in two standard sizes for most foundry applications — special units designed for the unusual problem. Complete information is contained in Sutter Bulletin "F". Send for it today.

SUTTER

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handling unit, molding station, mold conveyor and shakeout used in valve insert production. Highlight of the plant tour was watching molds being poured directly from the indirect arc electric rocking furnace.

After the inspection trip, the students were guests of company officials at a luncheon in the Colonial Room of the Hotel Schuler. Following the luncheon, a question and answer session was conducted by chapter officers and company officials. Details of the tour were arranged by A. E. Rhoads, president, and Fred Walls, vice-president, of Engineering Castings, Inc.

FUTURE CHAPTER MEETINGS

• JUNE 15

NORTHERN CALIFORNIA
Sequoyah Country Club
Ladies' Night Dinner Dance

• JUNE 16

EASTERN NEW YORK
Willowbrook Inn, Saratoga Rd., Schenectady
Picnic and Installation of Officers

QUAD CITY
Camp Noble on Rock River near Moline, Ill.
Annual Picnic

DETROIT
Place to be announced
Annual Outing

CENTRAL MICHIGAN
Cascades Country Club, Jackson
Annual Outing

• JUNE 21

CINCINNATI DISTRICT
Summit Hills Country Club, Cincinnati
Stag Picnic and Golf

• JUNE 23

NORTHWESTERN PENNSYLVANIA
Erie, Pa.
Annual Picnic

WESTERN NEW YORK
Sturm's Grove, Cheektowaga, N. Y.
Annual Stag Picnic

TOLEDO
Adams Township Conservation Club
Annual Picnic

• JUNE 30

NORTHEASTERN OHIO
Lake Forest Country Club, Hudson, Ohio
Annual Summer Outing

• JULY 30

TWIN CITY
Midland Hills Golf Club, St. Paul
Annual Golf Party

Missouri School of Mines

Norbert F. Neumann
Chapter Reporter-Photographer

April meeting featured a talk on *"Opportunities for the Graduate Engineer in the Foundry Industry"* by Robery H. Jacoby, Key Co., East St. Louis, Ill. A. F. S. National Director Elect A. L. Hunt, National Bearing Div., American Brake Shoe Co., St. Louis, chairman of the FEF Advisory Committee to the School, opened the program with a short resume of what FEF is doing for the students. Summer employment is available to MSM students in 25 foundries in the St. Louis area, Mr. Hunt stated.

Evening's highlight was Mr. Jacoby's talk, which dealt with the excellent chance for advancement in the foundry industry. At Key Co. from 1938 to date, 24 men have risen from the ranks to become executives and supervisors, he said.

Speaker for the March meeting was Herman J. Pfeifer, Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., who spoke on *"Uses of Ferro-Alloys in the Foundry."* Before going into the main text of his talk, Mr. Pfeifer stated that he was a 1936 graduate of the Missouri School of Mines and was well pleased with the school's foundry.

The speaker discussed the use of alloying metals for iron and steel castings and the properties that the various alloying elements impart to the metal. He stressed economics in the use of alloying elements, and concluded by suggesting that ladle addition be made instead of furnace addition, which, he said, would give 95 per cent metal recovery.

Northwestern Pennsylvania

Earl M. Strick
Erie Malleable Iron Co.
Chapter Secretary

Nearly 100 members heard Donald LaVelle, American Smelting & Refining Co., Barber, N. J., speak on *"Aluminum Casting Defects and Their Correction"* at the April 30 meeting.

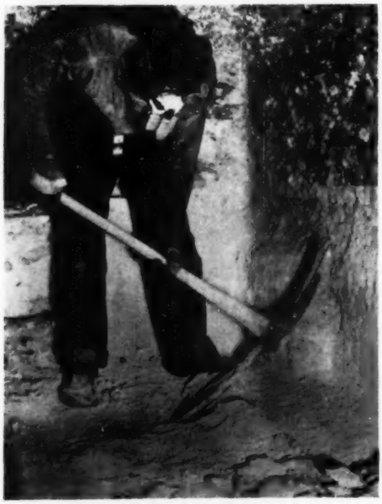
With the aid of slides Mr. LaVelle showed such defects as pinholes and scabs, and said that the following procedures will do much to overcome these defects:

(1) Watch temperatures closely. (2)

Photographed at the speaker's table during the April 10 joint meeting of the Eastern New York Chapters of A.F.S. and ASM were, left to right: A.F.S. Chapter Secretary Leigh Townley; ASM Program Chairman A. Burr; Charles Moriarty, General Electric Co., speaker; A.F.S. Chairman Leo M. Scully; ASM Chairman Eckel; ASM Past Chairman Chester Richards; ASM Vice-Chairman B. D. Ellis, ASM Secretary-Treasurer M. J. Fields, and A.F.S. Vice-Chairman John Waugh. Topic was non-destructive testing.

Metal WON'T Penetrate ...

TAYLOR ZIRCON hearths and side walls in aluminum remelting furnaces



Cleaning the interior of a 10-Ton Dempsey re-melt furnace, constructed with Taylor Zircon hearth and side walls, after having produced 13,800,000 lbs. of alloy No. 142 in approximately 10 months. Note the ease with which dross can be removed from the Taylor Zircon brick.

Damage caused by penetration of hearth and side wall refractories by aluminum metal is the principal cause of furnace failure. As *Taylor Zircon* refractories are inherently *resistant* to "wetting" by pure aluminum and most of the aluminum wrought alloys, they are ideally suited for the construction of hearths and side walls in aluminum remelting furnaces.

But Taylor Zircon's properties don't stop there. Here are further advantages that pay off in cleaner metal—higher yield—longer furnace life:

→ Contaminated or penetrated hearths are a source of inclusions and dirty metal. Taylor Zircon brick, bonded with thin, tight joints of Taylor Zircon Cement, are *not* penetrated by the metal. The metal remains clean, free from contamination by refractory inclusions.

→ As Taylor Zircon contains a negligible amount of free silica, silicon pick-up is eliminated.

→ Open hearth furnaces lined with Taylor Zircon can be cleaned or scraped, either h-o-t or cold, in *one-half* to *one-third* the time required to clean fire clay, super-duty or high alumina brick lined furnaces.

→ Metal composition can be changed without allowing for the loss of three or four wash heats. No metal will be trapped within or below the working face of the Zircon hearth, in a properly designed furnace.

There are certain aluminum die cast alloys containing copper, silicon, magnesium and titanium for which zircon is not recommended. Your Taylor representative will be glad to discuss Taylor Zircon possibilities for your plant. Write for your free copy of Bulletin No. 202.

Refractorers to industry since 1864.

The CHAS. TAYLOR SONS Co.

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line ladle to prevent aluminum picking up too much iron, (3) gate properly, (4) avoid pouring ring-type castings with one gate, (5) equalize pouring whenever possible, (6) watch for clay ball formation in sand heaps, (7) be sure scrap and pigs are clean before melting, (8) do not attempt to chill aluminum by adding scrap—let it stand until correct pouring temperature is reached, and (8) check every ladle of aluminum with pyrometer.

Ontario

O. A. Davies
General Smelting Co. of Canada
Chapter Director

March 30 meeting speaker was Clyde A. Sanders, who in his talk on *"Fundamental Aspects of Foundry Molding Sand and Its Effect on Certain Alloys,"* explained that recent investigations at Michigan State College verified previous investigations by Professors Womochel and Sigerfoos of that college, in that too little attention is paid to the effect of molding sand on "apparent metal shrinkage."

Much metal shrinkage, he said, is due to movement of the mold-metal interface and generally results in oversized castings. As an example, he said, gray iron is said to have less metal shrinkage upon solidification if the carbon equivalent is high, but mold-metal interface movement can result in "apparent metal shrinkage" in spite of this and can only be corrected by changing sand and molding procedures.

Western New York

Marve Taublieb
Frederic B. Stevens, Inc
Publicity Chairman

One of the largest crowds of the year turned out April 16 to hear J. A. Ridderhof of Frederic B. Stevens, Inc., Detroit, speak on *"Core and Mold Coatings."*

Dr. Ridderhof explained that core and mold washes are used to improve smoothness and eliminate costly casting surface defects, but, he said, they cannot overcome poor cores and molds. Washes, he added, are effective only at the sand's surface, penetrating no more than two to five grains below the surface.

Selection of the proper core or mold wash for a particular job must be based on the actual purposes of such materials: first, to prevent fusing of sand to casting surface; second, to stop penetration of metal into the sand; third, to insure a smoother casting surface. Attention must be paid, he stated, to the thickness of the metal section, remembering the heat-retaining qualities of the thicker and heavier sections.

Regarding mixing methods, he emphasized that a mechanical mixer is

recommended for preparing solutions, the propeller type being preferable, to insure a smooth solution that is free of lumps. To offset the formation of a vortex in the center of the mixture and the subsequent influx of too much air into the wash, several angle iron baffles should be attached vertically to the inside of the mixing tank. The air bubbles can cause poor coating and result in spotty molds.

Dr. Ridderhof cautioned not to add all the required water when starting a mix. Hold back part of it, and lower the Baume by degrees, allowing time for the solution to become smooth and free of lumps. Then add the remainder of the water until the proper Baume is reached. Constant checks of the Baume of dip tanks and comparison with posted recommendations for particular jobs will result in a desirable uniformity.

Dr. Ridderhof summarized his talk as follows: use mechanical mixers to mix washes; standardize and control Baume of all washes; keep mixing equipment and dipping and spraying tanks clean; remember that coatings and washes cannot overcome the defects of a poor mold.

Central Michigan

J. T. Ehman
Albion Malleable Iron Co.
Publicity Chairman

MARCH DINNER MEETING was held at the Hart Hotel, Battle Creek. John Zeindler, Albion Malleable Iron Co., acted as technical chairman and introduced O. J. Myers, Foundry Products Div., Archer-Daniels-Midland Co., Minneapolis, who spoke on *"Core Sand and Binders."*

Mr. Myers differentiated between natural and synthetic resin binders, explaining the properties and application of each. He elaborated on the use of synthetic binders, particularly the phenol and urea formaldehydes.

A series of slides followed the talk showing various pieces of testing equipment in A-D-M's Foundry Laboratory, and concluded with a series showing effects of various types of binders on the core baking cycle.

Philadelphia

G. H. Bradshaw
Philadelphia Naval Shipyard
Chapter Vice-Chairman

APRIL 13 MEETING was well attended, with 125 foundrymen hearing Douglas James, Cooper-Bessemer Corp., Grove City, Pa., speak on *"Nodular Iron."* Technical chairman for the evening was William A. Morley, Link-Belt Co.

Using slides, Mr. James described problems encountered in the early

stages of nodular iron's development and difficulties in adapting this material to products and in setting up foundry practices to meet its demands.

In explaining that there are many foundry problems to be solved in connection with use of nodular iron, Mr. James said that not all nodular iron castings have been good, but that the best are produced in dry sand molds. Pinhole porosity, he said, is encountered extensively when nodular iron is poured into green sand molds, and so far the problem has not been overcome.

Mr. James concluded by explaining that control plays a great part in producing nodular iron and that many difficulties are encountered when the metal's chemical analysis is not within the prescribed range.

Oregon

Norman E. Hall
Electric Steel Castings Co.
Chapter Reporter

Seventy-three members and guests met at the Heathman Hotel, Portland, April 23, to hear Charles Locke, Atlas Foundry & Machine Co., Tacoma, Wash., discuss the *"Fundamental Theory of Gating and Risering."*

Mr. Locke, who is chairman of the A.F.S. Steel Division, presented a highly interesting and informative talk on the subject, well illustrated with algebraic formulas and slides.

Membership Chairman Loren Bacon introduced three new members from Oregon Steel Foundry Co.—K. K. Machester, Philip J. Laugen and Morgan Rudich.

George Vann, Northwest Foundry & Furnace Co., won the A.F.S. Building Fund raffle prize—a deluxe Bag Boy, for carrying golf clubs. Concluding the meeting was a report on the progress of the A.F.S. Building Fund.

Ohio State University

John W. Wasem
Chapter Reporter

May 1 meeting was held in the University's Industrial Building with John Shinn, Catalin Corp., Chicago, speaking on latest developments in the Croning, or shell molding, process.

Following the discussion, Mr. Shinn gave a demonstration in the Foundry Laboratory of the shell molding process. Refreshments were served following the demonstration.

On May 5, the Student Chapter held its annual spring picnic. At the picnic J. G. Lummis, A. P. Green Fire Brick Co., was presented with a key symbolic of his election to Honorary Membership in the Student Chapter.

The Chapter was very pleased to receive the following letter from Mr. William W. Maloney, Secretary-Treasurer

of the American Foundrymen's Society, "We sincerely appreciate receiving your check of $10 from the Student Chapter at Ohio State University to the Building Fund, and you might like to know that your 'Over the Top' contribution has actually enabled us to go over the top. The Building is now definitely a reality, thanks to the good will and support this program has received from the entire membership."

Northern California

J. M. Snyder
Jos. Musto Sons - Keenan Co.
Publicity Chairman

On March 16 the chapter had the pleasure of hearing Joseph A. Gitzen, Delta Oil Products Co., Milwaukee, discuss *"Physical and Chemical Properties of Core Sand Additives."*

Mr. Gitzen covered the subject of cores and their manufacture and devoted the greater part of his talk to failings of various types of cores and core materials.

Central Indiana

Paul V. Faulk
Electric Steel Castings Co.
Chapter Reporter

May 7 meeting, held at the Athenaeum Turners Hall, Indianapolis, featured a talk on *"Statistical Quality Control"* and showing of a film *"Iron Ore to Motive Power,"* presented by Harry E. Gravlin and R. W. Gardner of Ford Motor Co., Dearborn, Mich.

The speakers stressed the fact that quality control is not a cure-all for foundry ills, but is a means of detecting trouble almost before it begins. Quality control, the speakers said, puts a tangible tool in the hands of supervisors, enabling them to settle problems quickly and accurately.

Past chapter chairmen were honored at the meeting. Present were B. P. Mulcahy, Fuel Research Laboratories (1942-43); Richard Bancroft, Perfect Circle Corp. (1943-44); Ray S. Davis, National Malleable & Steel Castings Co. (1945-46); Robert Langsenkamp, Langsenkamp - Wheeler Brass Works (1948-49) and S. Franklin Swain, Golden Foundry Co. (1949-50).

Concluding the meeting a slate of chapter officers and directors for 1951-52, headed by Chairman Robert Spurgin, III, Swayne Robinson Co., Richmond, Ind., was unanimously elected.

Southern California

S. L. Jackson
Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp.
Publicity Chairman

April 13 the chapter heard E. V. Sumner, Federated Metals Div., American Smelting & Refining Co., Los Angeles, speak on the *"Effect of Alloying Elements on Copper-Base Alloys."*

Preparatory to the showing of slides, Mr. Sumner explained phase diagrams and the information they portray. Thereafter, several slides were shown illustrating the effect of additions of alloying metals such as iron, phosphorus, beryllium, cadmium, aluminum, tin, nickel, arsenic, silver and zinc on properties of copper.

Mr. Sumner answered several questions, and then presented a motion picture entitled *"Golden Horizons,"* which described in color the history of copper and its alloys.

St. Louis District

N. A. Peukert
Carondelet Foundry Co.
Publicity Chairman

Speaker at the April 12 meeting was E. T. Kindt, Kindt-Collins Co., Cleveland, who spoke on *"Trends in the Pattern Industry."*

Mr. Kindt reviewed some new materials used in patternmaking and stated that the industry as a whole has too little conception of the problems of patternmaking.

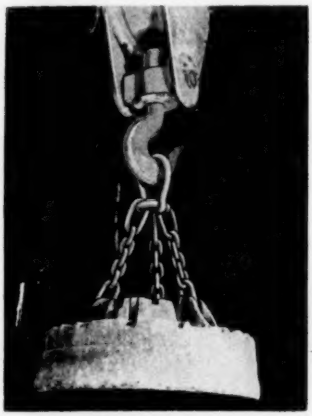
(Continued on Page 84)

NEW . . . Foundry . Products

For additional information on New Products, use postcard at bottom of opposite page.

Frictionless Magnet Chain

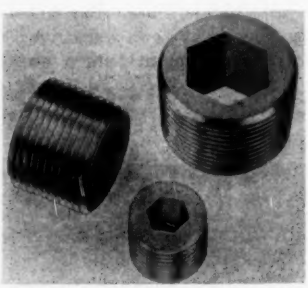
1—Downtown Type Frictionless Magnet Chain features design and locating plate that keep three suspension legs at 120 degree centers to prevent ganging up



on ring. Manufacture claims unit eliminates friction, twisting and gouging and assures level lifts and even distribution of load weight. Chain requires no annealing and is extremely resistant to shock and sub-zero temperatures. A $1\frac{1}{4}$ in. chain assembly on a 65-in. magnet will lift up to 110,000 lb. *S. G. Taylor Chain Co.*

Blow Bushings

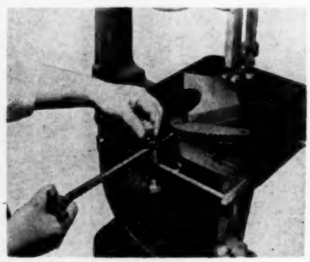
2—Several new sizes have been added to the line of Holiner bushings, which are now available in three outside dimensions with 5/16, $\frac{3}{8}$, 7/16, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$ and 1 in. hole sizes. The large bushings are made of the same oil and abrasion resistant materials as the smaller rubber models,



can be adjusted to meet an uneven or wedge-shaped core box, and help salvage old, eroded plates and core boxes. Bushings are designed to speed production of good cores by stopping blow plate abrasion. *Martin Engineering Co.*

Saw Feed Attachment

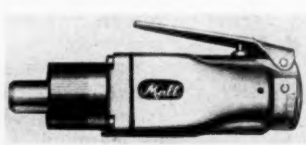
3—Screw feed attachment, designed for use with 14-in. metal cutting bandsaw features fingertip feed screw release for quick adjustment, star wheel to provide efficient feed action with little effort



and adjustable jaw usable in many positions for handling irregular-shaped work, and laterally adjustable pivot block. Entire screw assembly can be removed instantly to provide complete table clearance for handling larger work. *Power Tool Div., Rockwell Mfg. Co.*

Midget Pneumatic Grinder

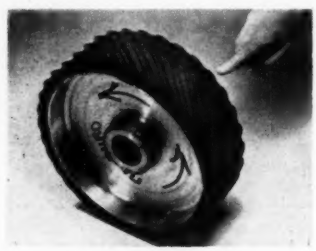
4—Pneumatic die grinder is designed to solve many precision grinding problems on small castings, dies and hard-to-get-at spots. Tool is $4\frac{3}{8}$-in. long, $1\frac{1}{4}$-in. wide and weighs 12 oz. Choice of lever or



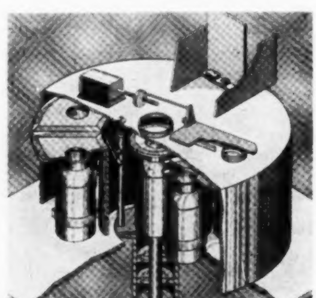
button throttles with collet guard allows operator to hold tool close to work and permits fingertip operation with better balance in tightest working areas. Arbor runout within .0015 in. allows extremely accurate work where pinpoint grinding is required. Eight sizes of collets are available to give complete range of shanks from 1/64 in. to $\frac{1}{4}$ in. Rotary vane air motor is cool running and develops 26,000 rpm. Speeds can be stabilized by built-in regulator. Air exhaust is directed away from operator to clean and cool work, and motor is equipped with new noise silencer. *Mall Tool Co.*

Contact Wheel

5—Entirely new type of contact wheel for abrasive belt application on backstand idlers of many types permits operator to increase production in operations where glazing normally occurs from standard abrasive belt. New "61" wheel is serrated rubber and causes a breakdown in bond of abrasive belt, reducing glazing. Wheel features relief angle, wide-spaced lands, and narrowness of lands, based largely on design of milling cutters. In comparative tests, new wheel permitted removal of 2 to $4\frac{1}{2}$ times total grams removed with use of other wheels, and average wheel



work life was increased from 1.8 to 5 times, with heat sensitive work increased from 1.7 to 3.8 times. *Carborundum Co.*



Dirt-Fall Collector

6—Directional Dirt-Fall Collector, a new instrument for analyzing air pollution problems in highly-industrialized

areas, has been developed by Battelle Memorial Institute and is now avilable commercially. The unit tells the direction from which large quantities of dirt come and will thus provide industries and municipalities with an index of the general location of plants responsible for heavy dirt fall. Collector also evaluates amount of dirt blown from across surrounding rivers. Designed to collect heavy dirt from any direction wind is blowing, instrument should be exposed for 30-day collection periods over several months to give reliable indication of sources of heavy contamination and amounts of collected material must be correlated with Weather Bureau data. *Eberbach & Sons Company.*

Three-way Truck

7—A new battery-operated freight truck, the Load-Mobile, features 3-way operation for safety, comfort, and maneuverability. The operator can either sit facing away from the load, face the load for maneuvering in narrow passages, or stand on the special step provided for easy access on and off the truck. Manufacturer claims the truck handles every job faster and easier with high efficiency at low operating cost. Large capacity cushion rubber wheels with sealed ball bearings assure minimum drain on battery. Both models, 3,000 lb and 5,000 lb capacity, travel at 3.5 to 4.0 mph with no load. With full load, the 3,000 lb truck goes 3.0 mph; the 5,000 lb truck, 2.5 mph. Can be used as tractor when furnished with suitable coupling. *Market Forge Co.*

Compressed Air Valves

8—New line of valves for automatic removal of contaminants and precipitates from compressed air lines, after-coolers, sumps, tanks, etc., is claimed by manufacturer to effect savings in manhours and critical maintenance materials. Line includes automatic separators and drains and has been field tested in industrial installations. In operation, when air valve is not in use diaphragm is forced down by back pressure and O-ring seals sump bottom. As air is used, pressure differential raises diaphragm and shaft, seals bottom of middle chamber, opens bottom of sump and blasts out contamination. *Wilkerson Corp.*

Self-Aligning Return Idler

9—Rex Style 33RA Self-Aligning Return Idler greatly reduces possibility of belt damage from roving by providing automatic alignment for return run of belt without use of side guide rolls. Unit is mounted on roller bearing turntable, with entire assembly tilted 45 degrees in direction of return belt travel. Lateral movement of belt moves side of roll forward and downward, decreasing belt pressure. Simultaneously, opposite side of roll moves backward and upward, increasing belt pressure. Through counterbalancing action belt thus automatically returns to central position. Action is equally effective with horizontal, inclined or declined conveyors and is unaffected by build-up of material on roll. Idler is equipped for high-pressure greasing and can be supplied with 4, 5 or 6 in. diameter steel rolls, or with 5-in. rubber-covered spiral roll. *Chain Belt Co.*

Bandsaw Table

10—Heavy duty, 36-in. stroke hydraulic table is available as an accessory that can be mounted to any standard DoALL bandsawing machine to adapt it to easy, accurate, vertical, straight line bandsawing of exceptionally bulky or heavy work pieces. Table is claimed by manufacturer to be a convenience in production sawing, cut-off work and for sawing intricate ferrous or non-ferrous castings for inspection. Table shown connected to Model V60 DoALL Band Machine has 40 x 48 in. table and carriage bed 87 x 36 in., which will support 3,000 lb load. Bed connects to machine and is supported by fabricated steel legs with leveling screws. Floor space of unit is 126 x 40½ in., weight 3,000 lb, and table surface is 45¾-in. from floor. Table has four "T" slots to receive work clamps, vises, etc. Hydraulic system consists of 5-gal reservoir with filler opening and clean-out plate and 2-gal-per-min, gear-type hydraulic pump driven by ¾ hp motor. Conveniently mounted controls govern rate of table feed up to 18 fpm and reversing speed of 36 fpm. *DoALL Co.*

Hardness Tester

11—Metalometer portable hardness tester features use of nylon bar stock bearing retainers, preventing instrument from becoming inaccurate due to friction on the plunger. Tester contains hardened steel rod which is locked in position when raised by knob at top of tester. Release of trigger releases plunger which rebounds from surface of test metal. At highest point of rebound, plunger is locked in position and permits hardness readings on instrument's Rockwell C, Rockwell B and Brinell scales. *Polymer Corp.*

Rear Drive Truck Carrier

12—One-ton flat bed rear drive truck carrier for fast hauls has high, low and reverse gear speeds controlled by single gear shift lever. Driver sits in elevated rear seat facing load. Front-wheel steering facilitates turns in narrow aisles. Designed as carrier vehicle and towing tractor, truck has low 20-in. bed, is 4 ft wide, with 5¼ ft bed length. Weight is 904 lb. Truck achieves speeds of 20 mph in high, 12 mph in second and 6.4 mph in low or reverse. Drawbar capacity allows for pull of 4,000 to 6,000 lb. *Gar-Bro Mfg. Co.*

FOUNDRY *Literature*

Readers interested in obtaining additional information on items described in Foundry Literature mail postcard below to Reader Service, American Foundryman, 616 S. Michigan Ave., Chicago 5. Refer to items by circling the convenient code numbers.

Refractory Products

13—Four-page illustrated folder describes Goose Lake fire clays and fire brick and Grundite bond clay. Applications and properties are given for fire clay brick, fire clay flour, silica mix, ground and screened fire clay, and bond clay. *Illinois Clay Products Co.*

Industrial Measurement and Control

14—Bulletin 450 on industrial instrumentation, 104 pp., plastic binder, contains in addition to a general catalog of Foxboro instruments a section on instrumentation in terms of measured variables, a section on instrumentation in terms of instruments and a section on useful engineering data. Photographs, charts, diagrams and tables illustrate text and quick index is provided for locating proper instrument for each industrial measurement and control problem. *Foxboro, Inc.*

Materials Handling

15—Four-step approach to improved materials handling is presented in an outsize illustrated brochure, "Quick Facts on Handling," which presents the entire Whiting line of materials handling equipment, including the Trackmobile, Trambeam overhead handling systems, electric chain hoists, overhead and economy-type cranes. Four-step plan briefly emphasizes effective approach to materials handling from management's point of view and stresses such resulting advantages as faster production, improved safety. Brochure presents typical installation view of each product, while smaller photos show variety of other applications. Text emphasizes primary engineering, operating and maintenance features. *Whiting Corp.*

Mineral Perlite Products

16—Data sheets describing use of new mineral perlite products in the foundry, including reprint of article, "Mineral Perlite—Foundry Uses," by Edward D. Boyle, master molder, Puget Sound Naval Shipyard (American Foundryman, July, 1950) are available gratis. These important new foundry materials have three applications (1) improving blowability of sticky sands in cores, (2) acting as cushioning agent in molding or facing sands to reduce expansion defects, buckles and rat-tails, and (3) as a riser insulation or topping compound to aid in control of directional solidification. Materials described in data sheets are manufactured to specification and are furnished as dry, lightweight inorganic aggregates or powders. *Great Lakes Carbon Corporation, Building Products Div.*

Basic Cupola Lining

17—Fourteen-page booklet, *"Basic Practice in the Foundry,"* describes six major benefits of converting cupolas to basic practice, and, impartially, describes disadvantages of basic cupola practice. Properties and applications of Gundol, a granular basic refractory comprising a mixture of dead burned dolomite and a stable dead burned high magnesia clinker, are given. Also described in detail is the BRI Gun, a refractory air emplacement gun that handles any dry basic or acid refractory mix up to ½ in. in top size and that will repair any cupola lining in 15 to 20 min. *Basic Refractories, Inc.*

Cut-Wire Shot

18—Four-page illustrated folder uses before-and-after photographs to illustrate characteristics and economies obtained by Cleveland cut-wire shot for cleaning and peening. Included in text is comparison table showing comparative amount of shot, maintenance and maintenance mate-

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Please send me detailed information on New Foundry Products and Foundry Literature items circled below.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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121	122	123	124	125	126	127	128	129	130										

rial costs between cast iron and cut-wire shot as reported by large manufacturer of chassis coil springs. *Cleveland Metal Abrasive Co.*

Blast Cleaning Turntable

19—Four-page illustrated bulletin announces a new "Turn-Style Table" for airless blast cleaning of castings. Bulletin, illustrated with four photos, a schematic diagram, and half-page dimensioned line drawing shows how machine saves dollars and labor by cleaning in one section while other section is being loaded. Also given are actual savings effected by users; operation of machine; protective features for operators; crane loading possibilities: "Turn-Style" variations and crane loading possibilities. *Pangborn Corp.*

Mold Drying

20—Issue No. 43 of the *Chromalox News* describes how a Milwaukee foundry, using radiant heaters to skin dry molds, obtains an extra mold for a 2,000-3,000 lb casting each day. Six 2½ kw all-metal infrared heaters accomplish the drying, which was formerly done by open kerosene torch. *Edwin L. Wiegand Co.*

Crucibles

21—Sixteen-page illustrated booklet presents entire line of American Crucibles and graphite products and is designed as a working handbook to help the foundryman in ordering equipment for melting metals of all kinds. Data of general interest in booklet include brief notes on the care and handling of crucibles. *American Crucible Company.*

Specimen Cut-Off Machines

22—Folder describes complete Buehler line of cut-off machines. Five models are available for samples from ½-in. diameter to 3-in. diameter. *Buehler, Ltd.*

Pattern-Draw Machines

23—Four-page illustrated catalog describes Spo Series 500 jolt rock-over pattern draw machines, featuring patented "inverted jolt" mechanism. Design features presented in booklet include centralized controls, adjustable air-locked leveling bars, single valve to control both flash clamp and leveling device, automatically controlled valve to govern entire rockover operation, and adjustable two-speed draw. Booklet includes dimensions, capacities, weights, vibrator size and other data, photographs and line drawings showing construction features. *Spo, Inc.*

Molding Machines

24—Complete line of Tabor molding machines and abrasive cutoff machines is described in spiral-bound series of bulletins. Included are complete descriptions of jar-squeeze flask lift machines, power squeeze flask lift machines of split pattern type, stack molding machines, squeezers and jar squeezers, vibrators, jarring machines; jar, rollover pattern-draw machines, cope and drag machines and several types of abrasive cutoff machines. *Tabor Manufacturing Co.*

CHAPTER ACTIVITIES

(Continued from Page 79)

The responsibility for this, he said, is due solely to failure of the patternmakers themselves to publicize their industry and its problems. This is due partly to the fact that the pattern industry is made up mostly of small companies, Mr. Kindt said.

In the discussion period following Mr. Kindt's talk it was stressed that pattern buyers leave too much responsibility to the patternmaker by not furnishing him with complete drawings and specifications.

Detroit

R. Grant Whitehead
Claude B. Schneible Co.
Chapter Reporter

"SUSTAINING MEMBERS' NIGHT" was the designation of the April 19 meeting and the evening's technical talk was given by E. H. Swensson, National Engineering Co., on *"Mechanization for Semi-Production and Jobbing Shops."* Mr. Swensson volunteered at the last moment to substitute for the regularly-scheduled speaker, Bruce L. Simpson, National Engineering Co., Chicago, who was unable to be present.

Western Michigan

C. H. Cousineau
Carpenter Bros., Inc.
Publicity Chairman

"Information Please," the first program of its kind in chapter history, was a feature of the March meeting. A panel composed of experts from all branches of the foundry industry, answered questions put by the audience.

Panel members were: Donald V. Bushong, Lakey Foundry & Machine Co.; Charles H. Cousineau, Carpenter Bros., Inc; Albert W. Demmler, Campbell, Wyant & Cannon Foundry Co.; Roy H. Herbst, West Michigan Steel Foundry Co.; W. R. Royce, Michigan Wheel Co.; and John A. Van Haver, Sealed Power Corp.

April meeting, held April 2 at the Cottage Inn, Muskegon, featured two speakers on *"Making Better Non-Ferrous Castings"*—R. A. Colton and Donald LaVelle of American Smelting & Refining Co.

Mr. Colton and Mr. LaVelle covered the making of non-ferrous castings from drawing board to consumer and made many worthwhile and practical recommendations.

A.F.S. National Vice-President and President Elect Walter L. Seelbach attended the meeting and gave a short talk on the current status of the A.F.S. Building Fund.

Rochester

Donald E. Webster
American Laundry Machine Co.
Chapter Reporter

ANNUAL BUSINESS MEETING at the Hotel Seneca, May 8, featured election of 1951-52 officers and directors, Secretary-Treasurer Duncan Wilson's annual report, and presentation of a gift to retiring chairman Kenneth R. Proud, Anstice Corp.

Following the business meeting several motion pictures on hunting, fishing and outdoor sports were shown. A buffet supper and social hour concluded the meeting.

Northern California

J. M. Snyder
Jos. Musto Sons - Keenan Co.
Publicity Chairman

EXCELLENT PROGRAM on *"Fundamentals of Non-Ferrous Melting,"* presented by George Dalbey, Mare Island Naval Shipyard," was witnessed by 65 foundrymen at the Hotel Shattuck, Berkeley, April 20.

Following Mr. Dalbey's excellent presentation was a forum discussion of the subject. Panel members were Don Caudron, Pacific Brass Foundry, moderator; Robert Johnson, General Metals Corp.; George Stewart, East Bay Brass Foundry; Robert C. Caldwell, Federated Metals Div., American Smelt-

ing & Refining Co.; and Norman Barnett, M. Greenberg's Sons.

A mimeographed chart was given each member of the audience, showing melting ranges of various alloyed nonferrous metals.

Announcement was made of nominations for chapter officers and directors for 1951-52, concluding the meeting.

Twin City

J. D. Johnson
Foundry Products Div.,
Archer-Daniels-Midland Co.
Chapter Reporter

APRIL 10 MEETING had as its speaker B. C. Yearley, National Malleable & Steel Castings Co., Cicero, Ill., who spoke on *"Gating and Risering."*

Speaking primarily on problems encountered in malleable and steel casting, Mr. Yearley declared that all casting feeding problems boil down to use of heat transfer principles—or getting the heat away from the casting in order to aid orderly metal solidification.

Elimination of casting dirt, he added, usually corrects casting blow conditions. Dirt is actually generated in molten metal by action of iron oxides within the silica mold surface. This dirt, he continued, can be carried into the mold cavity with the metal stream, the carrying power of the fluid metal being proportionate to the cube of the metal velocity.

Cleaning of the metal within the gating system is desirable, Mr. Yearley added, and can be accomplished by slowing down the incoming metal stream and allowing for metal cleansing by using a swirl-type gating system.

Following Mr. Yearley's talk was a showing of the Malleable Founders' Society film, *"This Moving World."*

Quad City

R. E. Miller
Deere & Co.
Chapter Secretary-Treasurer

A DIFFERENT METHOD of telling the story of airless cleaning was employed by A. L. Gardner, Pangborn Corp., Hagerstown, Md., at the April meet.

Using chalk illustrations, Mr. Gardner left no doubt as to the meaning of the phrase "cleaning room progress." He discussed various types of cleaning equipment, comparing airblast methods with shotblast methods, pointing out that airless cleaning requires only 20 hp, as compared to 200 hp for air blast cleaning.

Leonard Wagner, local Pangborn Corp. representative, took over the discussion period following Mr. Gardner's talk to answer technical questions concerning shotblast equipment.

Prior to the technical talk, Colonel Warner, commandant of Rock Island Arsenal, spoke on the effect of the Arsenal's demands on local foundries.

PERSONALITIES

(Continued from page 67)

has for the last three years operated his own marine hardware business near Los Angeles. He will assume active charge of technical sales for Rosan's Foundry Division, which goes into immediate production of castings utilizing the Rosan molded insert.

Jack B. Weil, who formerly conducted his own Chicago public relations firm for several years, has been appointed to the newly created position of director of public relations and advertising for Christiansen Corp., Chicago, and its three subsidiaries: Alumicast Corp., Chicago; Magnesium Co. of America, East Chicago, Ind.; and Bates Expanded Steel Corp., East Chicago, Ind. Mr. Weil, a former Chicago newspaperman, served on the financial news staff of the *Chicago Tribune* and as public relations director for Barnes & Reinecke, Inc.

Joseph L. Prus, assistant to the vice-president of the New York Operating Department of American Brake Shoe Co.'s Southern Wheel Division, has been appointed assistant manager of employee relations for American Brake Shoe Co. He is a graduate of the Pittsburgh School of Accountancy.

Three new directors elected to the Board of Diamond Iron Works, Inc., and Mahr Mfg. Co. are **James H. Binger,** general manager, Valve Division, Minneapolis-Honeywell Regulator Co.; **Melvin J. Carlson,** retired vice-president of Stewart Paint Mfg. Co.; and **George E. Erickson,** treasurer, C. J. Hoigrad Awning Co. Past directors reelected include **James P. Blaul, A. H. Daggett, W. C. McFarlane, H. C. Piper, L. J. Reay,** and **H. E. Wood.**

Morse G. Dial has been elected executive vice-president of Union Carbide & Carbon Corp., New York. A graduate of Cornell University, Mr. Dial joined the corporation in 1928 as a member of the sales staff, and since 1949 has been a director, vice-president and treasurer of the corporation. Simultaneously it was announced that **George O. Curme, Jr.,** has been elected vice-president in charge of research for Union Carbide & Carbon. Dr. Curme since 1948 has been vice-president in charge of chemical research and vice-president of Union Carbide's Bakelite Co. and Carbide & Carbon Chemicals Co.

Fred B. Skeates, personnel manager at Link-Belt Co.'s Pershing Road Plant, Chicago, has been appointed general superintendent at the plant, succeeding Richard Moyer, who becomes general manager of Link-Belt's North Central Division, Minneapolis. Mr. Skeates has been with the Pershing Road Plant since 1903 and Mr. Moyer has been with the company since 1937. Active for several years in A.F.S. committee work, Mr. Skeates is a member of the Educational Division's Youth Encouragement Committee and of the Chicago Chapter.

L. B. McKnight, a director and vice-president of Chain Belt Co., Milwaukee, since 1948, has been elected to fill the newly created position of executive vice-president of the company. Mr. McKnight, who is president of the National Association of Conveyor Equipment Manufacturers, has been with Chain Belt since 1927.

J. F. Smith, manager of the Philadelphia branch of Whitehead Metal Products Co., Inc., has been elected a vice-president of the company and will continue to maintain his headquarters in Philadelphia. He will be succeeded as Philadelphia branch manager by **R. W. Nuffort.**

Joseph DePari, molder, Hunt-Spiller Mfg. Corp., Boston, recently received a 35-year service pin from Vice-President and General Manager A. J. Edgar at an informal ceremony in the Boston plant. Also in the news from Hunt-Spiller is **Miss Stella R. Ellis,** who has been named chief chemist for the company. Miss Ellis, a graduate of Boston University, joined Hunt-Spiller's metallurgical department in 1943 as a laboratory technician.

Robert F. Muhleman, formerly sales engineer for a York, Pa., refrigeration and air conditioning firm, has been appointed assistant to President Thomas B. Belfield of Cochrane Foundry, Inc., York, Pa. An in-

dustrial engineering graduate of Ohio State University, Mr. Muhleman has had more than 20 years' experience in engineering, manufacturing and industrial sales. A Commander in the Naval Reserve, Mr. Muhleman served as a ship repair officer in England and later as industrial manager of shipyards in Bremerhaven, Germany, during and after World War II. In his new position, he will be engaged in general administrative duties and in the development of improved production techniques.

Arnold Hegelson, for 17 years a foundry and machine shop supervisor in Midwest and California metals firms, has been named director of Rosan, Inc.'s new Foundry Division at South Gate, Calif. In addition to supervising the foundry, Mr. Hegelson will collaborate with Rosan's engineers in furthering the firm's thread fastening development program.

William J. Schaeffer has been placed in charge of foundry production scheduling for Hunt-Spiller Mfg. Corp., Boston. Mr. Schaeffer formerly headed the firm's standard section.

Ralph O. Anderson, St. Louis district manager for the Norton Company, Worcester, Mass., has been appointed abrasive consultant to the Machinery Division of the National Production Authority. While Mr. Anderson is on loan to the government, he will be replaced at St. Louis by **Gwynn L. Parrott,** abrasive engineer.

OBITUARIES

Russell F. Lincoln, founder and president of the R. F. Lincoln Co., Cleveland foundry and molding equipment manufacturers' agents, died at his home in Lakewood, Ohio, April 5. Mr. Lincoln served as president of the A.F.S. Northeastern Ohio Chapter in 1943-44 and as secretary-treasurer of the chapter over a period of many years.

Stuart A. Dussault, president and general manager of the Dussault Foundry Corp., died on March 15.

James H. Knapp, president, James H. Knapp Foundry Co., Los Angeles, died April 1. Mr. Knapp was a member of the A.F.S. Southern California Chapter.

James A. Lynch, 63, president and owner of the Lynch Brass and Aluminum Foundry, Oakland, Calif., died May 3. Mr. Lynch was a charter member of the A.F.S. Northern California Chapter.

James G. Cowen, president and general manager of the Standard Foundry Co., Inc., Wabash, Ind., died April 1.

Edwin S. Carman, founder and head of Edwin S. Carman, Inc., engineers and foundry consultants, Cleveland, died recently in that city. Long associated with the Osborn Mfg. Co., Cleveland, in executive engineering capacities, Mr. Carman was responsible for the design of the first successful wholly power-operated cylinder molding machine for the automobile industry and conducted intensive investigations into the treatment of foundry molding sands. Mr. Carman formed the foundry engineering consulting service bearing his name in 1928 and in 1920 published the book, *"Foundry Molding Machines and Pattern Equipment."* He was past president of the American Society of Mechanical Engineers and of the Cleveland Engineering Society.

Karl F. Schmidt, 58, superintendent of the United Engineering & Foundry Co., Pittsburgh, and an employee of that organization for 34 years, died March 12 after a prolonged illness. He began his career with United following his graduation from Ohio State University in 1917. Mr. Schmidt was instrumental in the organization of the A.F.S. Canton District Chapter, of which he was a past chairman. He was also past president of the ASM Canton-Masillon Chapter and at the time of his death was president of the Stark County Ohio State Alumni Assn.

Ralph H. Salladay, 58, Electric Steel Foundry Co., Portland, Ore., died April 20 following a cerebral hemorrhage.

John Hamilton Morgan, Electric Steel Foundry Co., Portland, Ore., died April 10. In his 57th year, he had worked for the company since October 5, 1925.

FOUNDRY FIRM Facts

Archer-Daniels-Midland Co., Cleveland, announces the opening of a new product development pilot plant designed to provide a link between research and large-scale production of oils and fatty acids, at Minneapolis. The four-story plant will process all types of oils and fatty acids. Oils can be oxidized and modified under varying conditions of heat, vacuum, pressure and chemical reaction. According to President T. L. Daniels the plant can perform any operation that can be accomplished in the company's commercial plants with the exception of actually crushing flaxseed and soybeans. The plant will be operated by the ADM Research Division, headed by Vice-President S. O. Sorenson. James Konen, director of research, will be in charge, assisted by Newton D. Farel. Also announced by ADM are two new company divisions—the **Foundry Products Division,** headed by Vice-President L. P. Robinson—and the **Chemical Products Division,** headed by Vice-President Frank C. Haas. Both Divisions are located at Cleveland and will continue functions previously performed by the **Werner G. Smith Division.**

Great Lakes Carbon Corp. has started construction of 40 new coke ovens at its Merchant Coke Plant, St. Louis, to meet long-range coke needs of area industries. The ovens, which are of latest design and embody all modern developments in coke oven construction, will increase the plant's capacity by about 75 per cent when they begin operation in the summer of 1952. Units will be specially built for production of high grade foundry and industrial coke and, because of strictest quality controls, will provide tough, abrasion resisting coke of uniform size and structure, and maximum carbon content.

Mall Tool Co. is enlarging its portable electric tool plant at 7740 South Chicago Ave., Chicago.

Russo Foundry Equipment Co. has moved to a new location at 3882 Fairway Ave., Oakland 5, Calif. Telephone number is LOckhaven 8-1303.

Link-Belt Co., Chicago, announces construction of a modern engineering and manufacturing plant for the production of elevating, conveying and processing machinery, on a 43-acre site at Colmar, Pa. Designed for straight-line manufacture, the new plant is 880 ft long and contains 300,000 sq ft of floor space, including an office and cafeteria. The plant, which is being built to meet increasing Eastern area industrial needs, will supplement facilities at Nicetown, Pa.

General Refractories Co. has purchased a 29-acre tract near Warren, Ohio, where it will construct a $3 million silica refractories manufacturing plant, which will be equipped with latest screening, grinding and pressing machinery and with 600-ft-long oil burning tunnel kilns. A 1200-ft siding will be built to connect with the Baltimore & Ohio Railroad.

Standard Stoker Co., Erie, Pa., has changed its name to Read Standard Co. There has been no change in personnel.

Magnaflux Corp., Chicago, has leased 12,000 sq ft of floor area at 3416-40 N. Milwaukee Ave., Chicago, where it will operate a branch plant.

Dubuque Foundry Corp., East Dubuque, Ill., has been purchased by John Selgrath, Baker Mfg. Co., Evansville, Wis., W. A. MacNider and Byrne Potter. Under the new management, the company will produce light and heavy gray iron castings.

Fabricast Division. General Motors Corp., will erect a plant for the manufacture of aluminum castings at Jones Mills, Ark., with construction of the 100,000 sq ft plant beginning as soon as materials are available. Ultimately employing some 1,000 persons, the plant will produce permanent mold castings for use on defense items.

Steel Founders' Society of America recently cited seven steel casting companies for perfect safety records in the last calendar year. They are: **Hughes Tool Co.,** Houston, Texas; **Bethlehem Steel Co.,** Bethlehem, Pa.; **Hartford Electric Steel Corp.,** Hartford, Conn.; **Weatherley Steel Castings Co.,** Weatherly, Pa.; **Quincy Steel Casting Co., Inc.,** North Quincy, Mass.; **Malcolm Foundry Co., Inc.,** Newark, N.J.; and **Tonawanda Electric Steel Casting Corp.,** North Tonawanda, N. Y.

Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., announces that when its expansion program is completed in 1953, it will have increased its present ferro-alloy capacity some 200 per cent above its 1940 level. Expenditures of the company for new construction in the post-war period alone amount to $135 million. Included in this sum are construction at Electromet's new Marietta, Ohio, plant; a power installation at Ashtabula, Ohio; and projected construction of additions to the company's Ashtabula and Portland, Ore., plants. When Electromet's newest plant, at Marietta, Ohio, is completed, the company will have nine alloy-producing plants. A new alloy, an extra-low-carbon ferrochrome for stainless steel, is expected to be available in substantial quantities when the Marietta plant gets under way, and will alleviate limitations placed on the use of columbium in steels for high-temperature service.

St. Louis Coke & Foundry Supply Co. is the new name of the **M. W. Warren Coke Co.** Location of the company at 1525 Sublette Ave., St. Louis, and company personnel will remain unchanged.

Cleveland Vibrator Co. has completed another addition to its plant at 2786 Clinton Ave., Cleveland. The new addition will house new automatic screw machines for air vibrator production. The shipping room has been streamlined and automatic spray painting facilities have been installed in the plant.

Harry J. Winters Co., 1501 West Allegheny Ave., Philadelphia 32, Pa., has been organized by Harry J. Winters, president, and John T. McDowell, vice-president, to distribute a wide variety of cokes and core and molding sand additives and compounds. President and founder Harry J. Winters, has been associated with the foundry industry for more than 50 years, and was for many years sales representative for J. S. McCormick Co.

Lone Star Steel Co., Dallas, recently elected four new members to the Board of Directors: John T. Crim, Kilgore, Texas; Charles P. McGaha, Wichita Falls, Texas; and Robert Foree and Frank Ryburn of Dallas. Board members re-elected are: Chairman C. E. Owen, A. S. Genecov, Joseph M. Haddad, Henry M. Bell, Carl S. Shamburger, Dr. Edgar Vaughn, Watson W. Wise, Joe Zeppa, V. A. Clements, Ellie Hopkins, G. A. McCreight, W. O. Irvin, Leon Coker, Nathan Adams, Tyree L. Bell, John W. Carpenter, Fred F. Florence, E. B. Germany, Raleigh Hortenstine, D. Gordon Rupe, Jr., and Robert L. Thornton.

Cleveland Metal Abrasive Co., Cleveland, is completing construction of a concrete block and steel addition to its plant on East 67th St. Installation of such new equipment as more normalizing furnaces, wire cutting equipment and crushing rolls for production of hard iron grit is expected to increase output by 50 per cent.

Key Co., East St. Louis, Ill., announces election of the following company officers: Chairman of the Board, R. L. Dutton; President and general manager, B. J. Gross; vice-president and assistant general manager, L. W. Matthey, vice-presidents, G. A. Miller, F. B. Riggan and Miss I. F. Krabbe; treasurer, P. W. Smith; and secretary, G. J. Rothweiler.

E. F. Peterson of **Martin Engineering Co.,** Kewanee, Ill., has been awarded three new patents on the Peterson Vibrolator, a new vibrator designed to provide steady, rapid, all-directional movement of foundry sand and materials in bins and hoppers.

CONVENTION

(Continued from page 44)

use inferior machinery and materials.

Defense Production Luncheon Meeting, Wednesday, April 25, drew an overflow crowd of foundrymen to hear top officials of the National Production Authority discuss the role of the foundry industry in national defense. Meeting speakers were A. J. McDonald, Chief, Castings Section, Iron & Steel Division, NPA; John A. Claussen, Chief, Pig Iron Section, Iron & Steel Division, NPA; Lieut. Comdr. William A. Meissner, Bureau of Ships, liaison officer to NPA; and Nigel Bell, Director, Light Metals Division, NPA.

National Vice-President Elect Walter L. Seelbach, Superior Foundry, Inc., Cleveland, presided at the Luncheon.

Annual Business Meeting of the American Foundrymen's Society was held in the Statler's Ballroom at 2:00 p. m., Wednesday, April 25, with A.F.S. National President Walton L. Woody presiding and delivering the President's Annual Address, in which he reviewed the Society's accomplishments during the past year and cited its aims and policies for the coming year.

A. F. S. National Secretary Wm. W. Maloney, in accordance with By-Laws of the Society, announced the election of 1951-52 officers and directors of the Society, introducing each of them in turn. President Walton L. Woody then presented first-place winners in the five divisions of the A. F. S. Apprentice Contest (AMERICAN FOUNDRYMAN, May 1951, page 60) with certificates and cash prizes, praising their efforts as an example of "what young men can do by their own efforts in the real American tradition."

Hoyt Annual Lecture

Immediately following the Society's Annual Business Meeting was presentation of the Convention's top technical address, the Charles Edgar Hoyt Annual Lecture, by James C. Zeder, director of Engineering and Research, Chrysler Corp., Detroit.

Speaking on *"The Management of Industrial Research,"* Mr. Zeder said that business recognizes that industrial research is necessary for survival in today's economy by employing 150,00 men to carry out $450 million annually in industrial research. This research, he said, can be classified into four categories: (1) academic research, (2) engineering or applied research, (3) product engineering and development, and (4) production testing.

Research, he continued, must be profitable, must operate on a budget, and should be put to immediate use, rather than await further development.

Criterion of successful research, Mr. Zeder said, is—will it produce new industry, new goods, new happiness? Research, the speaker admitted, is a gamble, but the biggest gamble of industry is to do no research at all. Mr. Zeder concluded by saying that "To pioneer is to make mistakes, not pioneer is to fail."

At the conclusion of Mr. Zeder's address, he was presented with an engrossed certificate and a gift from the Society by Gosta Vennerholm, Ford Motor Co., chairman of the Annual Lecture Committee.

Three sessions held at 4:00 p. m., follow-

ing the Hoyt Lecture, were sponsored by the Plant and Plant Equipment and Refractories Committees, and Sand Division.

Plant and plant equipment session led off with presentation of *"Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings,"* by Leslie N. Schuman, National Malleable & Steel Castings, Co., Cleveland, with Charles Schneider speaking in the author's absence. (The paper is condensed on pages 48-49 of this issue.) Second session paper, *"Dimensional Checking and Pressure Testing of Gray Iron Castings,"* by K. M. Smith of Caterpillar Tractor Co., Peoria, Ill., was presented by Frank W. Shipley of that organization. Dimensional checking, Mr. Shipley said, insures minimum scrap loss from molding, core setting, and pouring variations by providing indications of undesired foundry practice variables before scrap loss occurs in the foundry.

James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., presided at the plant and equipment session. Co-chairman was Harold W. Johnson, Wells Mfg. Co., Skokie, Ill. At a simultaneous refractories meeting the co-chairmen were R. H. Stone, Vesuvius Crucible Co., Pittsburgh, and Robert P. Schauss, Illinois Clay Products Co., Chicago.

Ladle and Furnace Refractories

Refractories session featured a general discussion of *"Ladle Refractories and Practice in Acid Electric Steel Foundry,"* led by Clyde Wyman, Burnside Steel Foundry Co., Chicago. Discussion included such topics as side walls and bungs; spray coatings; use of larger bricks and fewer joints in air furnace bottoms; effect of temperature increases on refractories; airplacement materials and processes for cupola repair; and use of rammed refractories for spouts, and for desulphurizing, receiving, and pouring ladles.

Sand session opened with presentation of *"Some Notes on Core Oil Testing,"* by A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada; H. H. Fairfield, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., Canada; and B. Richardson, Steel Castings Institute of Canada. The authors described oven modifications designed to improve core uniformity, and the effects of humid storage and high oven humidities on baked strength of core oils.

Second speaker J. Wesley Cable, Thermex Div., Girdler Corp., Louisville, Ky., described the rapid increase in dielectric core baking installations in postwar years. This, he said, is because the process was not offered to the foundry industry prematurely and because it has effected great savings in the production of cores.

Presiding at the session on core baking was Elmer C. Zirzow, Deere & Co., Moline, Ill., with H. K. Salzberg, Borden Co., Bainbridge, N. Y., as co-chairman.

At the A.F.S. Alumni Dinner Wednesday evening, past and present gold medalists, honorary life members, and officers and directors heard Kenneth L. Wilson, Big Ten athletic commissioner, speak on the value of athletics to the country's youth, and supply the narration for a showing of color motion pictures of the last Tournament of Roses parade and

football game. Presiding at the dinner were Immediate Past President E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., and C. E. Hoyt, retired executive vice-president, now secretary of the A.F.S. alumni.

Evening technical sessions were the second on plant and plant equipment, and the concluding Gray Iron Shop and Sand Shop Course meetings. R. J. Wolf, Stone & Webster Engineering Corp., Boston, presided at the plant and equipment session, where C. H. Hastings, Watertown Arsenal, Watertown, Mass., spoke on *"Choosing Equipment for Nondestructive Testing,"* and H. C. Weimer, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, showed a motion picture entitled *"Mechanization in Molding."*

Mr. Hastings discussed use and selection of equipment for radiographic, magnetic particle, penetrant, and ultrasonic tests.

"Metal Pouring Temperature Control," was the discussion topic of Ralph A. Clark, Electro Metallurgical Div., Union Carbide & Carbon Corp., Detroit, at the Gray Iron Shop Course session. He described care and use of equipment for measuring metal temperatures and told how foundrymen can reduce temperature losses by proper metal handling. Kenneth H. Priestley, Vassar Electroloy Products, Inc., Vassar, Mich., and E. J. Burke, Hanna Furnace Co., Buffalo, were co-chairmen.

Presiding at the Sand Shop Course meeting was R. H. Jacoby, Key Co., East St. Louis, Ill. Co-chairman was H. W. Meyer, General Steel Castings Corp., Granite City, Ill. Speaking on *"Foundry Sand Control,"* C. B. Schureman, Baroid Sales Div., National Lead, Co., Chicago, concentrated on metal penetration. Regardless of sand mixture, he said, penetration will occur if proper molding and ramming techniques are not followed. Penetration will occur, he explained, whenever the mold or core face contains too-large void spaces.

Thursday, April 26

The last day of the 1951 Convention started with a breakfast for past presidents of the Society. Present were: Ralph J. Teetor, president in 1944; James L. Wick, Jr. (1936); President Walton L. Woody; H. Bornstein (1937); W. R. Bean (1920-22); G. H. Clamer (1923); N. K. B. Patch (1930); Secretary Emeritus R. E. Kennedy; Secretary-Treasurer Wm. W. Maloney; Benjamin D. Fuller (1917); Wm. H. McFadden (1906); W. B. Wallis (1918); L. L. Anthes (1909); Henry S. Washburn (1939); Executive Vice-President (retired) C. E. Hoyt; Herbert S. Simpson (1941); L. N. Shannon (1940); Fred J. Walls (1945); Edwin W. Horlebein (1949); Marshall Post (1939); Vice-President Elect I. R. Wagner; and President Elect Walter L. Seelbach.

Technical meetings started at 10:00 a.m. with sessions sponsored by the Steel Division and by the Gray Iron Division. At the steel meeting John A. Rassenfoss, American Steel Foundries, East Chicago, Ind., presided and Harry W. Dietert, Harry W. Dietert Co., Detroit, was co-chairman. *"Precoat Materials for Investment Casting,"* by W. F. Davenport and

A. Strott, Wright-Patterson Air Field, Dayton, Ohio, was presented by Lt. Davenport. He described a two-step investment process using a pre-coat slurry on a disposable pattern to obtain a coating thickness of about 0.02 in. An alumina-silica coating showed most promise, he said, and magnesia was unsatisfactory.

In presenting the paper he co-authored with E. T. Myskowski and W. S. Pellini, H. F. Bishop, Naval Research Laboratory, Washington, D. C., discussed their paper "*Contribution of Riser and Casting End Effects to Soundness of Cast Steel Bars.*" The paper covered experiments with square bars of varying length and cross-section to determine effective feeding distance of risers. Discussion centered around the role of convection in encouraging directional solidification in horizontal and vertical cast bars.

Session Chairman Rassenfoss presented the paper "*An Investigation of the Penetration of Steel into Molding Sand*" in the absence of the author, Holger Pettersson, Metallografiska Institute, Stockholm, Sweden. Mr. Pettersson used a variation of the Caine dip test to study penetration at various metal pressures into silica sand bonded with bentonite.

The official exchange paper from the Institute of British Foundrymen was presented at the gray iron session by E. S. Renshaw, Ford Motor Co., Ltd., Dagenham, England.

Max Kuniansky of the Lynchburg Foundry Co., Lynchburg, Va., presided; Gosta Vennerholm, Ford Motor Co., Dearborn, Mich., was co-chairman. Mr. Renshaw described production experiences with the basic cupola, slag conditions which favor desulphurization to low limits and high carbon pickup, and the possibility of taking advantage of these factors in nodular iron production.

In their paper "*Importance of Slag Control in Basic Cupola Operation,*" R. A. Flinn and R. W. Kraft, American Brake Shoe Co., Mahwah, N. J., pointed out that slag control is the heart of basic cupola practice. They analyzed equilibrium data for reactions between slag and metal and described slag control under production conditions. A three-variable nomograph they developed permits prediction of desulphurizing behavior of a cupola slag.

At noon the Gray Iron Division and the Steel Division held round table luncheons. Gray iron foundrymen heard a panel discuss "*Gray Iron Melting with Materials Available.*" Panel members were: J. F. Dobbs, New York Air Brake Co., Watertown, N. Y.; S. A. Kundrat, Homestead Valve Mfg. Co., Coraopolis, Pa.; and A. J. MacDonald, Hanna Furnace Co., Buffalo. Alexander O. Barczak, Superior Foundry, Inc., Cleveland, presided; C. A. Harmon, Hanna Furnace Co., was co-chairman.

Mr. Dobbs outlined the use of anthracite coal as a cupola fuel, which he said could be used up to 55 per cent of the normal coke charge with tolerable results. Too much coal gives a dense charge which resists the blast, he declared.

Mr. Kundrat discussed iron melting units other than cupolas. They leave

much to be desired, he stated, and are not always designed from the standpoint of the foundryman. Mr. MacDonald described the efforts of blast furnace operators to increase pig iron tonnage.

At the steel luncheon, V. E. Zang, Unitcast Corp., Toledo, Ohio, and D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., presided over a discussion covering alloy substitutions and conversion, increasing casting and total yield, sulphur, and acid vs. basic practice.

The 2:00 p.m. gray iron session had as co-chairmen V. A. Crosby, Climax Molybdenum Co., Detroit, and R. Schneidewind, University of Michigan. Papers and their authors were: *"Structure and Mechanical Properties of a Mo-Ni-Cr Cast Iron,"* A. E. Loria, Carborundum Co., Niagara Falls, N. Y.; *"Kinetics of Graphitization in Cast Irons,"* B. F. Brown, North Carolina State College of Agriculture and Engineering; and M. F. Hawkes, Carnegie Institute of Technology, Pittsburgh; and *"Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron,"* F. B. Rote and G. A. Conger, University of Michigan, and K. A. DeLonge, International Nickel Co., Bayonne, N. J.

Mr. Loria described properties of an iron containing 2.77 per cent carbon, 1.40 per cent silicon, 1.40 per cent molybdenum, 1.00 per cent nickel, and 0.50 per cent chromium as-cast and after tempering at 400, 600, and 700 F. Properties on a 1.2-in. diameter bar included an as-cast strength of 72,500 psi which rose to 98,300 psi on tempering.

A possible mechanism, involving carbide stability, for the effects of alloying elements on rates of graphitization was suggested by Brown and Hawkes. Their paper discussed the morphology and kinetics of the various graphitization reactions in cast irons.

The work of Rote, Conger, and DeLonge covered the development of a complete T-T-T diagram for an alloyed white iron containing 3.40 per cent carbon, 1.15 per cent silicon, 0.35 per cent manganese, 4.50 per cent nickel, 1.85 chromium, and 0.12 molybdenum. Data were obtained by hardness tests and microscopic examination of wedge-shaped castings, directly air-cooled from the mold to sub-eutectoid temperatures for isothermal transformation.

Frank Kiper, Ohio Steel Foundry Co., Springfield, Ohio, and G. W. Johnson, Vanadium Corp. of America, Chicago, presided at the 2:00 p.m. steel session. J. R. Goldsmith presented the paper *"Effect of Vanadium on Properties of Cast Chromium-Molybdenum Steels"* co-authored with N. A. Ziegler and W. L. Meinhart, Crane Co., Chicago. He reported on a study of low carbon steels with relatively high chromium and molybdenum contents and vanadium up to 0.30 per cent. Tensile and yield properties increased, he said, and ductility and impact decreased slightly. The reduction in toughness, he pointed out, does not hold true for the normal chromium-molybdenum steels.

"Mechanical Properties of Alloy Cast Steel and the Relative Influence of Mass and Segregation," by John Wallace and

John Savage, Watertown Arsenal, Watertown, Mass., and Howard F. Taylor, Massachusetts Institute of Technology, was presented by Major Savage. Properties of test bars taken from the center and edge of 5-in. diameter specimens were compared with the conclusion that tensile and yield strength and ductility are reduced in heavy sections whereas impact properties are unaffected. The impossibility of pouring a light section test bar to represent actual properties of heavy section castings was discussed.

In his paper *"Usefulness and Ill Effects of Gases in Metallurgy,"* E. Spire, Canadian Liquid Air Co. Ltd., Montreal, Que., described techniques in the use of porous ceramic plugs installed in pouring ladles for flushing metals with inert gases, for providing contact between liquid metal and solid desulphurizing agents, and for chemical treatment of metals with active gases.

Presiding at the 4:00 p.m. gray iron session was Howard H. Wilder, Vanadium Corp. of America, Detroit, with J. L. Brooks, Muskegon Piston Ring Co., Sparta, Mich., and F. T. McGuire, Deere & Co., Moline, Ill., as co-chairmen.

First session paper, *"Improvement of Machinability in High Phosphorus Gray Cast Iron—Part II,"* by W. W. Austin, Southern Research Institute, Birmingham, Ala., told of results of an investigation sponsored by Woodward Iron Co., Birmingham, at the Institute. Mr. Austin said that application of a desulphurization-zirconium addition treatment for high-phosphorus gray iron resulted in improved machinability. Best results, he said, were obtained by desulphurizing with calcium carbide in the basic-lined cupola, followed by ladle additions of zirconium ferrosilicon. Good machinability was also obtained, he concluded, by using caustic soda and a specialreladling technique at a cost of $2.75 per ton.

Following Mr. Austin's paper were an explanation of the relationship between *"Chill Tests and the Metallurgy of Gray Iron,"* by D. E. Krause, Gray Iron Research Institute, Columbus, Ohio, and the use of *"Silicon-Chromium Alloy in Complicated Iron Castings,"* described by R. A. Clark, Electro Metallurgical Co., Union Carbide & Carbon Corp., Detroit.

Sand session at 4:00 p.m., final technical session of the 55th Convention, opened with a discussion of *"Silica Sands—Sieve Analyses,"* with Harold B. Gardner speaking for Authors A. I. Krynitsky and F. W. Raring, all of the National Bureau of Standards, Washington. Object of the paper was to study precision of the A.F.S. fineness test. Under test procedures described, the authors concluded that the type of equipment has little effect on accuracy.

Second session paper *"Testing of Sands Under Impact,"* by W. H. Moore, Meehanite Corp., Cleveland Heights, Ohio, described a machine that indicates toughness of molding or core sand at high temperatures. From experiments with the machine the author concluded that (1) the drop in toughness usual in the first minute of shock heating is responsible for formation of buckles and expansion defects, (2) increasing hot toughness dur-

ing this period makes it possible to overcome expansion defects in green and dry sands, and (3) so-called cushioning agents increase hot toughness, and this is possibly the reason why they help overcome expansion defects.

A third, unscheduled paper, a report of Committee 8-J, was presented by Committee Chairman Victor Rowell, Cordell Industries, South Bend, Ind., for discussion from the floor under Session Chairmen Harry W. Dietert, Harry W. Dietert Co., Detroit, and Clyde A. Sanders, American Colloid Co., Chicago. This discussion brought out that scabbing tendencies decreased as high hot strength and sand expansion were overcome. Wood flour additions to molds were reported to be beneficial.

Banquet Climaxes Convention

Annual Banquet of the American Foundrymen's Society, top social event of the foundry year and climax of the 55th Convention, was held at 7:00 p.m. in the Ballroom of the Hotel Statler, with A.F.S. National President Walton L. Woody presiding. More than 400 foundrymen and their ladies attended, including many internationally known figures in the casting field.

Featured event of the Annual Banquet this year, as in past years, was presentation of A.F.S. Gold Medals for outstanding achievement in the casting of metals and the awarding of Honorary Life Membership in the American Foundrymen's Society for service to the industry and the Society.

Six Foundrymen Honored

Gold Medal recipients were Alfred A. Boyles, United States Pipe & Foundry Co., Burlington, N. J., the John H. Whiting Gold Medal; Victor A. Crosby, Climax Molybdenum Co., Detroit, the John A. Penton Gold Medal; and Thomas W. Curry, Lynchburg Foundry Co., Lynchburg, Va., the Peter L. Simpson Gold Medal.

Awarded Honorary Life Memberships in A.F.S. were E. W. Beach, retired; Edward J. McAfee, Puget Sound Naval Shipyard, Bremerton, Wash.; and A.F.S. National President Walton L. Woody.

Speaker Blends Humor, Wisdom

Concluding feature of the Banquet and of the 55th A.F.S. Convention was the Annual Banquet Address, *"Which Knew Not Joseph,"* a blend of humor, drama and wisdom presented by one of the nations outstanding public speakers — Dr. Kenneth McFarland of Topeka, Kansas.

Taking as his theme the story of Joseph, who was a powerful figure in Egypt in Old Testament days, but whose works were soon forgotten after his death. Dr. McFarland said that American industry's history parallels that of Joseph in that its accomplishments are taken for granted by the next generation. Thus, he said, industry must constantly anticipate the needs of its employees and its customers, rather than be forced by strikes into improving working conditions, or into improving its products only when dissatisfied customers have deserted to competitive industries.

Index to Advertisers

Ajax Electrothermic Corp. 16
American Air Filter Co., Inc. 14
American Lava Corp. 85
Apex Smelting Co. . . . . Back Cover
Archer-Daniels-Midland Co. (Foundry Products Div.) . . . 98—Inside Back Cover
Arrow Tools Inc. 76
Bakelite Co., A Division of Union Carbide & Carbon Corp. 15
Baroid Sales Div., National Lead Co. . . 96
Beardsley & Piper Div., Pettibone Mulliken Corp. 78
Black, Sivalls & Bryson, Inc. 11
Carborundum Co., The 8
Chicago Wheel & Mfg. Co. 90
Christiansen Corp. 9
City Pattern Foundry & Machine Co. . . 12
Cleveland Flux Co. 4
Cleveland Metal Abrasive Co. 31
Cleveland Quarries Co. 86
Cleveland Vibrator Co. 92
Corn Products Sales Co. 19
Crucible Manufacturers' Assn. 77
Dayton Oil Co. 76
Delta Oil Products Co. 28
Detroit Electric Furnace Div., Kuhlman Electric Co. 20
Dietert, Harry W., Co. 76
Dow Corning Corp. 30
Eastern Clay Products, Inc. 7
Electro Metallurgical Co., A Division of Union Carbide & Carbon Corp. . . . 63
Federal Foundry Supply Co. 1
Federated Metals Div., American Smelting & Refining Co. 24
Great Lakes Carbon Corp. 87
Industrial Equipment Co. 22
International Nickel Co. 65
Jackson Iron & Steel Co. 94
Keokuk Electro-Metals Co. 26
Kirk & Blum Mfg. Co. 27
Lindberg Engineering Co., Fisher Furnace Div. 5
Mall Tool Co. 92
Marshall, L. H., Co. 79
Mathieson Chemical Corp. 2
Miller Motor Co. 17
Milwaukee Chaplet & Mfg. Co. 83
National Carbon Co., A Division of Union Carbide & Carbon Corp. 13
National Engineering Co. 32
Ohio Ferro Alloys Corp. 18
Oliver Machinery Co. 90
Ottawa Silica Co. 91
Penola Oil Co. 23
Pittsburgh Lectromelt Furnace Corp. . . . . Inside Front Cover
Research Corporation 90
Robinson Clay Product Co. 84
Schneible, Claude B., Co. 6
Scientific Cast Products Corp. 94
Semet-Solvay Div., Allied Chemical & Dye Corp. 93
Standard Horse Nail Corp. 93
Standard Safety Equipment Co. 91
Stevens, Frederic B., Inc. 25
Sutter Products Co. 73
Tamms Industries 91
Taylor, Chas., Sons Co. 75
Taylor, S. G., Chain Co. 95
Tennessee Products & Chemical Corp. . . 10
Tincher Products Co. 89
Union Carbide & Carbon Corp.
Bakelite Co. 15
Electro Metallurgical Co. 63
National Carbon Co. 13
U. S. Graphite Co. 29
U. S. Hoffman Machinery Corp. 95
Vonnegut Moulder Corp. 94

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